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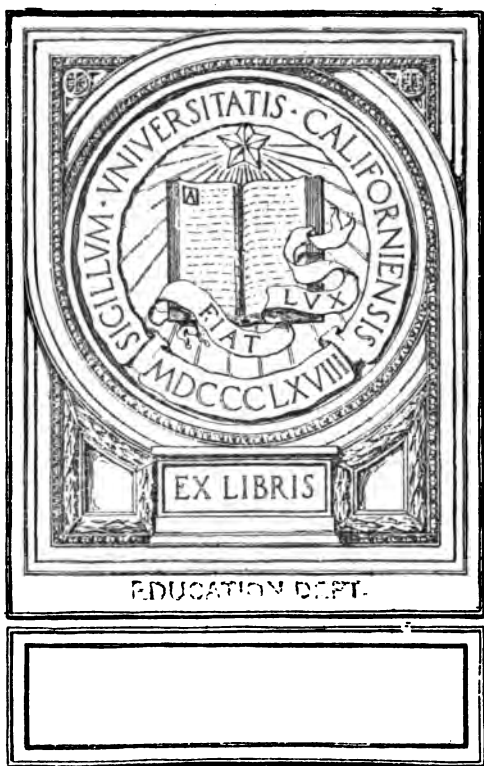
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C. A. Glover



8/28/15



COMMERCIAL GEOGRAPHY



COMMERCIAL GEOGRAPHY

A BOOK FOR HIGH SCHOOLS
COMMERCIAL COURSES, AND
BUSINESS COLLEGES

REVISED EDITION

BY
JACQUES W. REDWAY, F.R.G.S.

Author of a Series of Geographies, "An Elementary
Physical Geography," "The New Basis of Geography"

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EDUCATION DEPT.



PREFACE

THE quiet industrial struggle through which the United States passed during the last decade of the nineteenth century cannot fail to impress the student of political economy with the fact that commercial revolution is a normal result of industrial evolution. Within a period of twenty-five years the transportation of commodities has grown to be not only a science, but a power in the betterment of civil and political life as well; and the world, which in the time of M. Jules Verne was eighty days wide, is now scarcely forty.

The invention of the Bessemer process for making steel was intended primarily to give the railway-operator a track that should be free from the defects of the soft, wrought-iron rail; in fact, however, it created new industrial centres all over the world and brought Asia and Africa under commercial conquest. The possibilities of increased trade between the Atlantic seaboard and the Pacific Coast States led to the building of the Northern Pacific and Great Northern Railways. But when these were thoroughly organized, there unexpectedly resulted a new trade-route that already is drawing traffic away from the Suez Canal and landing it at Asian shores by way of the ports of Puget Sound. It is a repetition of the adjustment that occurred when the opening of the Cape route to India transferred the trade that had gathered about Venice and Genoa to the shores of the North and Baltic Seas.

In other words, a new order of things has come about,

and the world and the people therein are readjusting themselves to the requirements made upon them by commerce. And so at the beginning of a new century, civilized man is drawing upon all the rest of the world to satisfy his wants, and giving to all the world in return; he is civilized because of this interchange and not in spite of it.

The necessity for instruction in a subject that pertains so closely to the welfare of a people is apparent, and an apology for presenting this manual is needless. Moreover, it should not interfere in any way with the regular course in geography; indeed, more comprehensive work in the latter is becoming imperative, and it should be enriched rather than curtailed.

In the preparation of the work, I wish to express my appreciation of the great assistance of Principal Myron T. Pritchard, Boston, Mass. I am also much indebted to the map-engraving department of Messrs. The Matthews-Northrup Company, Buffalo, N. Y.

J. W. R.

PREFACE TO THE REVISED EDITION

The plan and scope of this edition have not been changed. The only alterations in the text are those necessary to bring the subject-matter up to date.

J. W. R.

Mt. Vernon, N. Y.

1911

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TO THE TEACHER:—The contents of this book are so topicalized and arranged that, if the time for the study is limited, a short course may be selected. Under no circumstances, however, should Chapters V, VI, VIII, IX, XII, and XIII be omitted. A casual inspection of the questions at the end of each chapter will serve to show that they cannot be answered from the pages of the book, and they have been selected with this idea in view. They are intended first of all to stimulate individual thought, and secondly to encourage the pupil to investigate the topics by consulting original sources. The practice of corresponding with pupils in other parts of the world cannot be too highly commended.

The following list represents a minimum rather than a maximum reference library. It may be enlarged at the judgment of the teacher. A good atlas and a cyclopædia are also necessary.

Industrial Evolution of the United States. **WRIGHT.** Charles Scribner's Sons.

History of Commerce in Europe. **GIBBINS.** The Macmillan Company.

Discovery of America. **FISKE.** Houghton, Mifflin & Co.

The New Empire. **ADAMS.** The Macmillan Company.

Statesman's Year-Book. **KELTIE.** The Macmillan Company.

The Wheat Problem. **CROOKES.** G. P. Putnam's Sons.

From the Bureau of Statistics, Department of Commerce, Washington, D. C., the following monographs may be procured: *

Commerical China. American Commerce. Commercial Australia. Commercial Japan. Commercial Africa. Commercial India. Statistical Abstract. Great Canals of the World. World's Sugar Production and Consumption.

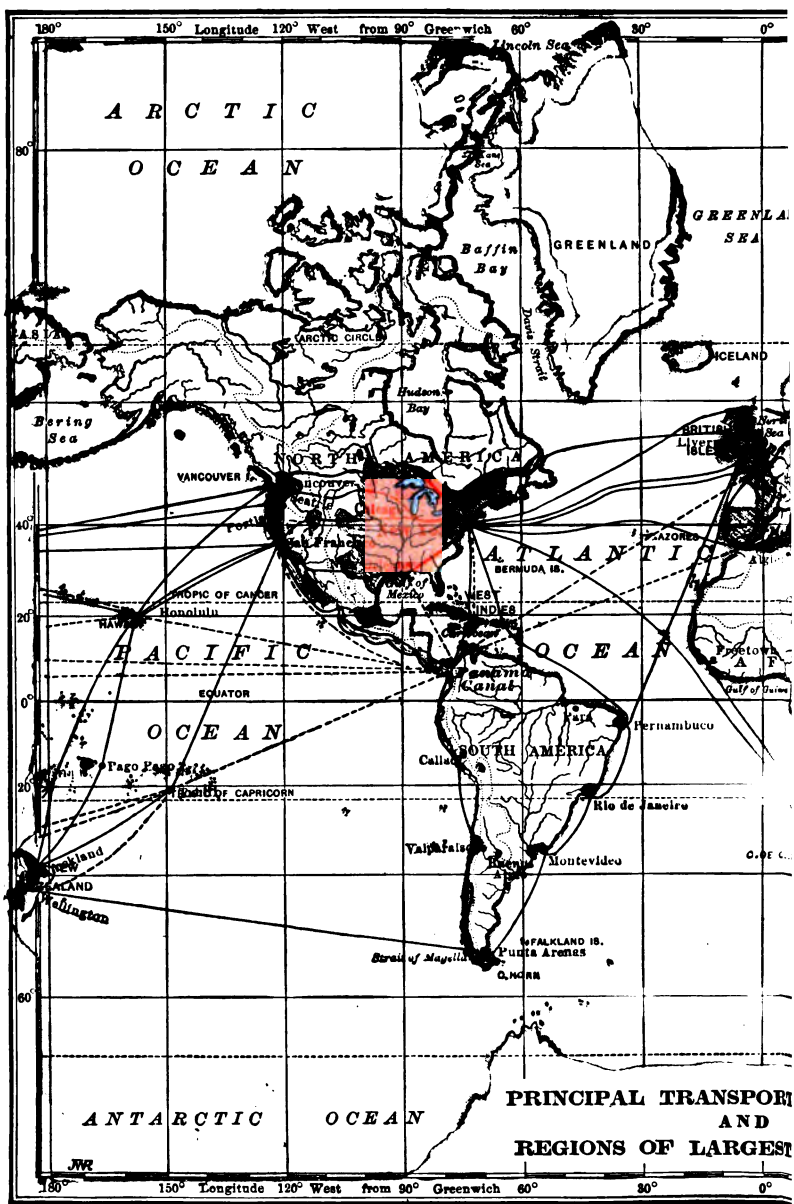
The following from the Department of Agriculture is necessary:

Check List of Forest Trees of the United States.

Lantern slides illustrating the subjects treated in this book may be procured from T. H. McAllister, 49 Nassau Street, New York. Stereographic photographs may be obtained from the Keystone View Company, Meadville, Pennsylvania.

* If the edition for free distribution is exhausted, these may be purchased from the Superintendent of Documents, Public Printer, Washington, D. C.







COMMERCIAL GEOGRAPHY

CHAPTER I

GENERAL PRINCIPLES

COMMERCE and modern civilization go hand in hand, and the history of the one is the history of the other; and whatever may be the basis of civilization, commerce has been the chief agent by which it has been spread throughout the world. Peoples who receive nothing from their fellow-men, and who give nothing in return, are usually but little above a savage state. Civilized man draws upon all the rest of the world for what he requires, and gives to the rest of the world in return. He is civilized because of this fact and not in spite of it.

Relation
of Commerce
to
civilization

There is scarcely a country in the world that does not yield something or other to civilized peoples. There is scarcely a household whose furnishings and contents do not represent an aggregate journey of several times around the earth. A family in New York at breakfast occupy chairs from Grand Rapids, Mich.; they partake of bread made of wheat from Minnesota, and meat from Texas prepared in a range made in St. Louis; coffee grown in Sumatra or Java, or tea from China is served in cups made in Japan, sweetened with sugar from Cuba, stirred with spoons of silver from Nevada. Spices from Africa, South America, and Asia season the food, which is served on a table of New Hampshire oak, covered with

World-
wide
demands
of a
breakfast

a linen spread made from flax grown in Ireland or in Russia. Rugs from Bokhara, or from Baluchistan, cover the floors; portières made in Constantinople hang at the doors; and the room is heated with coal from Pennsylvania that burns in a furnace made in Rhode Island.

A difference
between
civilization
and
savagery

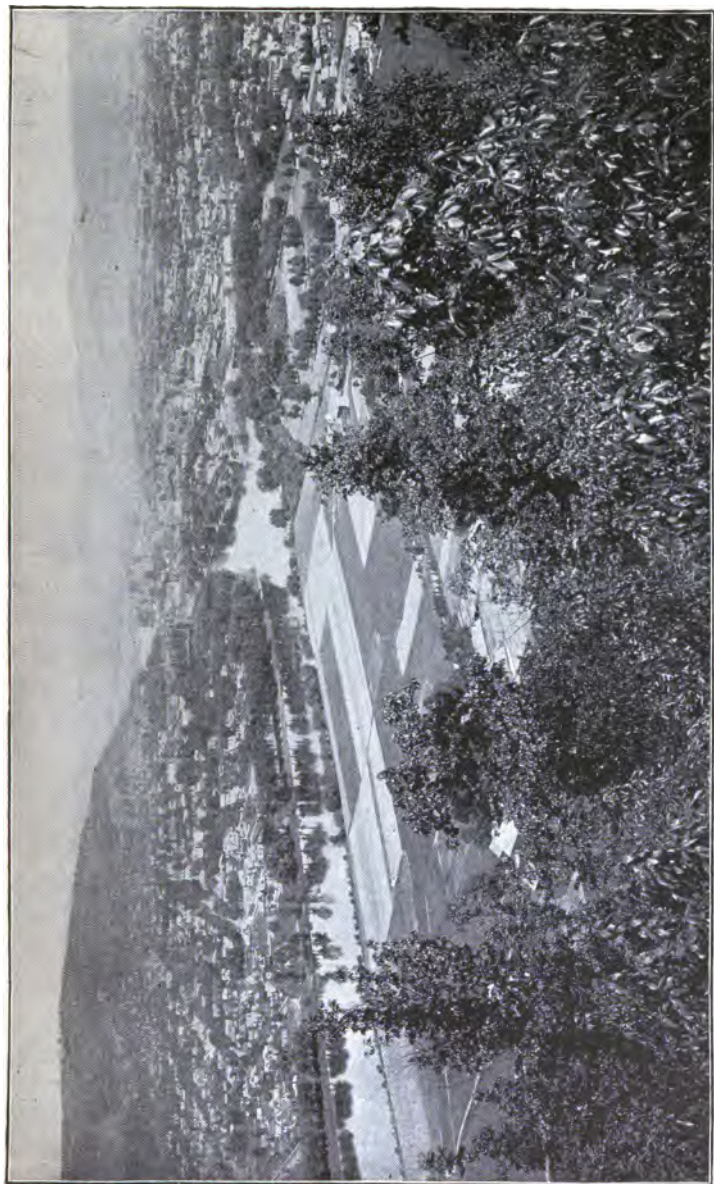
Now all these things may be, and usually are, found in the great majority of families in the United States or Europe, and most of them will be found in nearly all households. Certain it is that peoples do exist who, from the immediate vicinity in which they live, procure all the things they use or consume. In the main, however, such peoples are savages.

Every
industry
in each
household

A moment's thought will make it clear that before an ordinary meal can be served there must be railways, steamships, great manufacturing establishments, iron quarries, and coal mines, aggregating many thousand millions of dollars, and employing many million people. A casual inspection, too, reveals the fact that all of the substances and things required by mankind come from the earth, and, a very few excepted, every one requires a certain amount of manufacture or preliminary treatment before it is usable. The grains and nearly all the other food-stuffs require various processes of preparation before they are ready for consumption by civilized peoples. Iron and the various other ores used in the arts must undergo elaborate processes of manufacture; coal must be mined, broken, cleaned, and transported; the soil in which food-stuffs are grown must be fertilized and mechanically prepared; and even the water required for domestic purposes in many instances must be transported long distances.

Everything
from the
earth

A little thought will suffice to show that not only are all food-stuffs derived from the earth, but that also every usable resource which constitutes wealth is also drawn from the same source. The same is also pretty nearly



AGRICULTURE AND MANUFACTURE SUPPLEMENT EACH OTHER

Transformation of
energy

true of the various forms of energy, for although the sun is the real source of light and heat, and probably of electricity, these agents are usable only when they have been transformed into earth energies. Thus, the physical energy generated by falling water is merely a transformed portion of solar heat; so also the coal-beds contain both the chemical and physical energy of solar heat and light converted into potential energy—that is, into force that can be used at the will of intelligence. Indeed, the physical being of mankind is an organism born of the earth, and adapted to the earth; and when that physical form dies, it merely is transformed again to ordinary earth substances.

all
industries
for the
sake of
life

The chief activities of living beings are those relating to the maintenance of life. In other words, animals must feed, and they must also protect themselves against extermination. In the case of all other animals this is a very simple matter, they simply live in immediate contact with their food, migrating or perishing if the supply gives out. In the case of mankind the conditions are different and vastly more elaborate. Savage peoples excepted, man does not live within close touch of the things he requires; indeed, he cannot, for he depends upon all the world for what he uses. In a less enlightened state many of these commodities were luxuries; in a civilized state they have become necessities. Moreover, nearly everything civilized man employs has been prepared by processes in which heat is employed.

Kinds of
industries

Therefore one may specify several classes of human activities and employments:

- (a) The production of food-stuffs and other commodities by the cultivation of the soil—*Agriculture*.
- (b) The preparation of food-stuffs and things used for shelter, protection, or ornament—*Manufacture*.

- (c) The production of minerals for generating power, such as coal, or those required in the arts and sciences, such as iron, copper, stone, etc.—*Mining*.
- (d) The exchange of food-stuffs and commodities—*Commerce*.
- (e) The transfer and distribution of commodities—*Transportation*.

To these may be added the products of the sea.

It is evident that the prosperity of a people depends very largely on the condition of their surroundings—that is, their environment. If a country or an inhabited area produces all the food-stuffs and commodities required by its people, the conditions are very fortunate. A very few nations, notably China and the United States, have such diverse conditions of climate, topography, and mineral resources, that they can, if necessary, produce within their national borders everything needed by their peoples.

China and the United States self-supporting

The prosecution of such a policy, however, is rarely economical; in the history of the past it has always resulted in weakness and disintegration. China is to-day helpless because of a policy of self-seclusion; and the marvellous growth of Japan began when her trade was thrown open to the world.

Results of seclusion

For the greater part the environment of a people is deficient—that is, the locality of a people does not yield all that is required for the necessities of life. For instance, the New England plateau requires an enormous amount of fuel for its manufacturing enterprises; but practically no coal is found within its borders; hence the manufacturers must either command the coal to be shipped from other regions or give up their employment. The people of Canada require a certain amount of cotton cloth; but the cotton plant will not grow in a cold climate, so they must either exchange some of their own commodities

Regions of defective production

for cotton, or else go without it. The inhabitants of Great Britain produce only a small part of the food-stuffs they consume; therefore they are constantly exchanging their manufactured products for the food-stuffs that of necessity must be produced in other parts of the world.

The dwellers of the New England plateau might grow the bread-stuffs they require, and in times past they did so. At that time, however, a barrel of flour was worth twelve dollars. But the wheat of the prairie regions can be grown, manufactured into flour, transported a thousand miles, and sold at a profit for less than five dollars a barrel. Therefore it is evidently more economical to buy flour in Minnesota than to grow the wheat and make it into flour in Massachusetts.

All these problems, and they exist without number, show that man may overcome most of the obstacles that surround him. So we find civilized man living in almost every part of the world. Tropical regions are not too scorching, nor are arctic fastnesses too cold for him. In other words, because of commerce and transportation, he can and usually does master the conditions of his environment; his intelligence enables him to do so, and his ability to do so is the result of the intelligent use of experience and education.

How
peoples
economize

Civilized
man the
master of
environ-
ment

CHAPTER II

HOW COMMERCE CIVILIZED MANKIND

THE history of western civilization is so closely connected with the development of the great routes of travel and the growth of commerce that one cannot possibly separate them. Commerce cannot exist without the intercourse of peoples, and peoples cannot be in mutual communication unless each learns from the other.

Feudalism.—When the Roman Empire fell civilization in western Europe was not on a high plane; indeed, the feudalism that followed was not much above barbarism. The people were living in a manner that was not very much unlike the communal system under which the serfs of Russia lived only a few years ago. Each centre of population was a sort of military camp governed by a feudal lord. The followers and retainers were scarcely better off than slaves; indeed, many of them were slaves. There was no ownership of the land except by the feudal lords, and the latter were responsible for their acts to the king only.

Life under
feudal
system

But very few people cared to be absolutely free, because they had but little chance to protect themselves; so it was the common custom to attach one's self to a feudal lord in order to have his protection; even a sort of peonage or slavery under him was better than no protection at all. A few of the people were engaged in trade and manufacture of some kind or other, and they were the only ones through whom the feudal lord could supply himself with

the commodities needed for his retainers and the luxuries necessary to himself.

Each feudal estate, therefore, became a sort of industrial centre by itself, producing its own food-stuffs and much of the coarser manufactures. It was not a very high condition of enlightenment, but it was much better than the one which preceded it, for at least it offered protection. It encouraged a certain amount of trade and commerce, because the feudal lord had many wants, and he was usually willing to protect the merchant who supplied them.

Each
feudal
state an
industrial
centre

The Crusades and Commerce.—The Crusades, or wars by which the Christians sought to recover the Holy Land from the Turk, resulted in a trade between Europe and India that grew to wonderful proportions. Silk fabrics, cotton cloth, precious stones, ostrich plumes, ivory, spices, and drugs—all of which were practically unknown in Europe—were eagerly sought by the nobility and their dependencies. In return, linen and woollen fabrics, leather goods, glassware, blacklead, and steel implements were carried to the far East.

Commerce
results
from
Crusades

Milan, Florence, Venice and Genoa, Constantinople and a number of less important towns along the Mediterranean basin became important trade centres, but Venice and Genoa grew to be world powers in commerce. Not only were they great receiving and distributing depots of trade, but they were great manufacturing centres as well.

Trade
centres of
Europe

The routes over which this enormous commerce was carried were few in number. For the greater part, the Venetian trade went to Alexandria, and thence by the Red Sea to India. Genoese merchants sent their goods to Constantinople and Trebizond, thence down the Tigris River to the Persian Gulf and to India. There was also another route that had been used by the Phoenicians. It extended

Trade
routes

from Tyre through Damascus and Palmyra* to the head of the Persian Gulf; this gradually fell into disuse after the founding of Alexandria.

The general effects of this trade were very far-reaching. To the greater number of the people of Europe, the countries of India, China, and Japan were mythical. According to tradition they were infested with dragons and gryphons, and peopled by dog-headed folk or by one-eyed Arimaspians. About the first real information of them to be spread over Europe was brought by Marco Polo, whose father and uncle had travelled all through these countries during the latter part of the thirteenth century.† Marco Polo's writings were very widely read, and influenced a great many people who could not be reached through the ordinary channels of commerce. So between the wars of the Crusades on the one hand, and the growth of commerce on the other, a new and a better civilization began to spread over Europe.

Popular
ignorance
of foreign
lands

Influence
of Marco
Polo

The Turkish Invasions.—But the magnificent trade that had thus grown up was checked for a time by an unforeseen factor. The half-savage Turkomans living south-east of Russia had become converted to the religion of Islam, and in their zeal for the new belief, determined to destroy the commerce which seemed to be connected with Christianity. So they moved in upon the borderland between Europe and Asia, and one after another the trade routes were tightly closed. Then they captured Constantinople, and the routes between Genoa and the Orient were

The Turks
blockade
trade
routes

* The greatness of Palmyra was due to the trade along this route, and its decay began when the route was abandoned. The present town of Tadmor is near the ruins of the former city.

† Cosmas Indicopleustes—in early life a merchant, in later years a monk—visited India and Ceylon during the first part of the sixth century. His writings contain much valuable knowledge, but in the main they are theological arguments intended to disprove the Geography written by Ptolemy.

hermetically sealed. Moslem power also spread over Syria and Egypt, and so, little by little, the trade of Venice was throttled.

Now a commerce that involved not only many millions of dollars, but the employment of thousands of people as



ROUTES TO INDIA—
THE TURK CHANGES THE COMMERCE OF THE WORLD

well, is not likely to be given up without a struggle. So the energy that had been devoted to this great trade was turned in a new direction, and there began a search for a new route to India—one that the Turks could not blockade.

The Search for an All-Water Route to India.—Overland routes were out of the question; there were none that could be made available, and so the search was

Search for
a new
trade route

made for a sea-route. Rather singularly the Venetians and Genoese, who had hitherto controlled this trade, took no part in the search; it was conducted by the Spanish and the Portuguese.

Spanish
and Portu-
guese con-
duct search

The Spanish monarchs, Ferdinand and Isabella of Castile, fitted out an expedition under Christopher Columbus, a master-mariner and cartographer, the funds being provided by Isabella, who pledged her private property as security for the cost of the expedition. This expedition resulted in the discovery, October 10-21, 1492, of the West India Islands. In a subsequent voyage, Columbus discovered the mainland of South America.

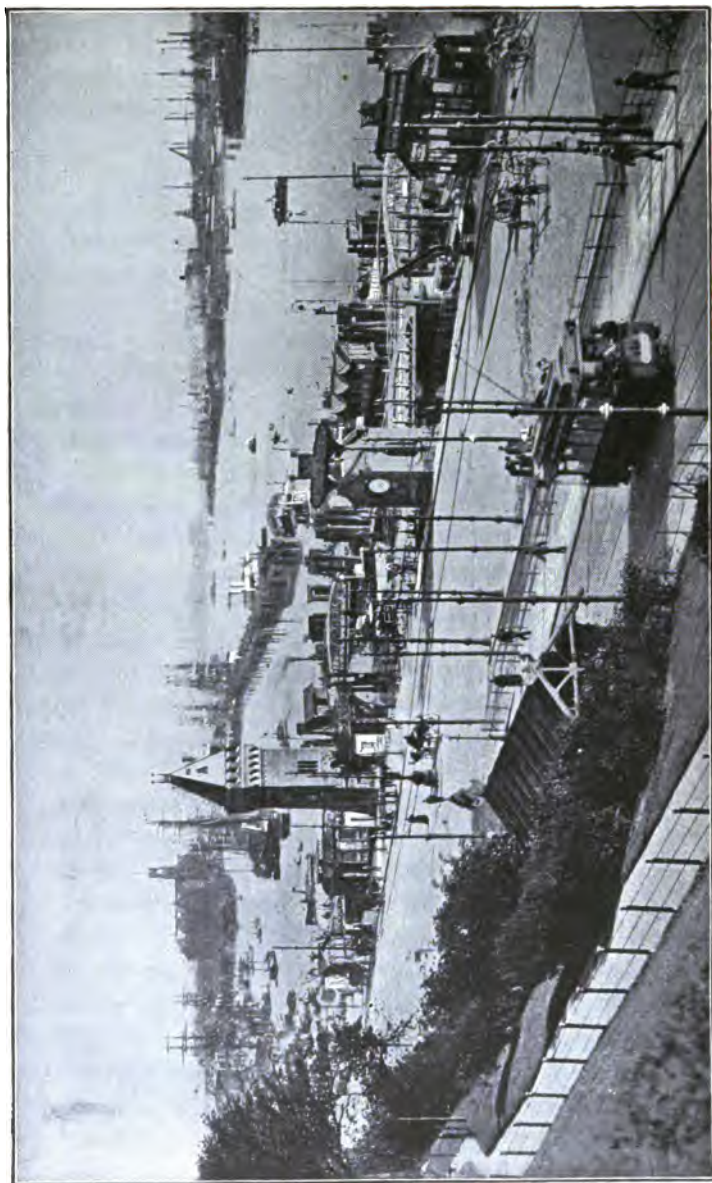
Voyages of
Columbus

Even before the voyage of Columbus, the Portuguese had been trying to find a way around Africa to India, and Pope Eugenius IV. had conferred on Portugal "all heathen lands from Cape Bojador eastward even to the Indies." Little by little, therefore, Portuguese navigators were pushing southward until, in 1487, Bartholomew Dias sighted the Cape of Good Hope, and got about as far as Algoa Bay. Then he unwillingly turned back because of the threats of his crew. It was a most remarkable voyage, and one of the shipmates of Dias was Bartholomew Columbus, a brother of the discoverer of the New World.

Dias sights
Cape of
Good Hope

Ten years later, or five years after the voyage of Columbus, Vasco da Gama sailed from Lisbon for the Cape of Good Hope. As he passed the Cape he was terribly storm-tossed, but the storms carried him in a fortunate direction. And when at last he got his reckonings, he was off the coast of India; he therefore kept along the coast until in sight of a port. The port was the well-known city of Calicut. Two years later he returned to Europe by the same route, his ships laden with spices, precious stones, beautiful tapestries and brocades, ivory and bronzes. The long-sought sea-route to India had been discovered.

Da Gama
rounds
Africa to
Calicut



A HANSE CITY—HAMBURG, ALONG THE WATER-FRONT

Commerce in Western Europe.—After the discovery of the new route, Venice and Genoa were scarcely heard of in relation to commerce; they lost everything and gained nothing. The great commerce with the Orient was to have a new western terminus, and the latter was to be on the shores of the North and Baltic Seas.

New trade route terminates at North and Baltic ports

The commerce between Europe and India stimulated trade in western Europe as well. As early as the twelfth century the manufacture of linen and woollen cloth had grown to be a very important industry that had resulted in the rapid growth of population. The older cities grew rapidly, and new ones sprang up wherever the commodities of trade were gathered, manufactured, or distributed.

Growth of cloth manufacture

These centres of trade had two hostile elements against them. The feudal lords used to pillage them legally by extorting heavy taxes and forced loans whenever their treasuries were empty. The portionless brothers and relatives of the feudal lords, to whom no employments save war, adventure, and piracy were open, pillaged them illegally. Along the coasts especially, piracy was considered not only a legitimate, but a genteel profession. So in order to protect themselves, the cities began to join themselves into leagues.

Extortion of feudal lords results in defensive leagues

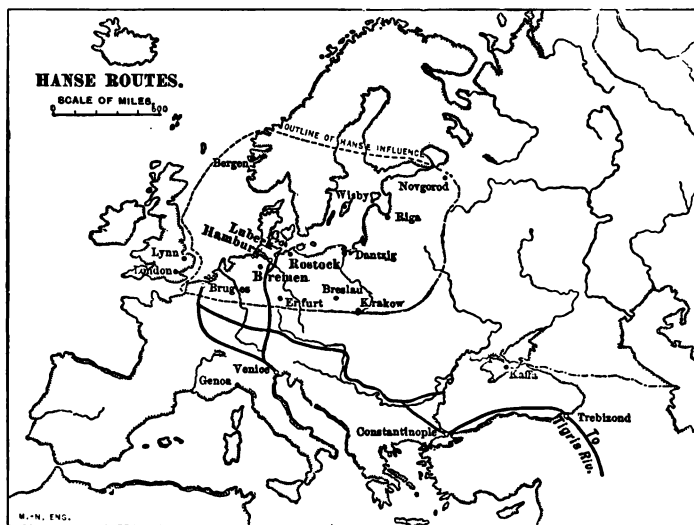
The Hanse League.—Some time in the thirteenth century* Hamburg and Lübeck formed an alliance afterward called a *hansa*; shortly afterward, the city of Bremen joined the League; at the beginning of the fourteenth century it embraced seventy cities, having the capital at Lübeck. At the time of its greatest power the League embraced all the principal cities of western Europe. Agencies, called "factories," were established in London, Bruges, Novgorod, Bergen, and Wisby. The influence of the League controlled western Europe.

Rise of Hanse League

* The date is variously given as 1169, 1200, and 1241.

Work of
Hanse
League

The Hanse League performed a wonderful work. It stopped piracy on the seas and robbery on the land. Industrially, it encouraged self-government and obedience to constitutional authority. Shipbuilding and navigation so greatly improved that the ocean traffic resulting from the discovery of the cape route to India quickly fell into the hands of Hanse sailors and master-mariners. The League



HANSE ROUTES—

THE HANSE LEAGUE REORGANIZES THE TRADE OF THE WORLD

not only encouraged and protected all sorts of manufactures, but its schools trained thousands of operatives. The mines were worked and the idle land cultivated. It was the greatest industrial movement that ever occurred.

Socially, the Hanse League brought the wealth that gave those comforts and conveniences before unknown. The standards of social life, education, art, and science were

raised from a condition scarcely better than barbarism to a high plane of civilization. Indeed, the civilization of western Europe was the most important result of it.

It forced the rights of individual freedom, as well as municipal independence, from more than one monarch, and punished severely the kings who sought to betray it. It crushed the power of those who opposed it,* and rewarded those who were faithful to it. Its most important mission, however, was the overthrow of feudalism and the gradual substitution of popular government in its place.

Hanse
League
encourages
popular
govern-
ment and
civilization

Having accomplished the regeneration of Europe, the Hanse League died partly by its own hand, because of its arrogance, but mainly from the fact that, having educated western Europe to self-government and commercial independence, there was no longer need for its existence. Independent cities grew rapidly into importance, and these got along very well without the protection of the League. The great industrial progress was at times temporarily checked by wars, but it never took a backward step. Indeed the progress of commerce has always been a contest between brains and brute force, and in such a struggle there is never any doubt about the final outcome.

Decline of
Hanse
League

Growth of
free cities

Much of the business of the League was carried on by a system of fairs. At a certain time of the year merchants from all parts of Europe were accustomed to assemble at one or another of the Hanse cities. The fairs lasted from a few weeks to several months, and at times more than fifty thousand people were in attendance. The fairs at Leipzig date from the middle of the thirteenth century. In a way they are continued at the present time, and the city is one of the principal markets of the world for furs, skins, and various animal products. The fairs of Lower

Commerce
carried on
by fairs

*To Waldemar III. of Denmark it dictated terms that made its power in Scandinavia supreme.

Novgorod have also survived, and the business transacted yearly aggregates many millions of dollars in value.

QUESTIONS FOR DISCUSSION

What were some of the effects of Cæsar's invasion of Germanic Europe so far as commerce is concerned ?

What were some of the effects on commerce of the breaking up of the Roman Empire ?

How did the invasion of England by William of Normandy affect the commerce of the English people ?

Who was Henry the Navigator, and what did he accomplish ?

How did the blockade of the routes between Europe and India bring about the discovery of America ?

What was the result of the great voyage of the Cabots ?

Was the overthrow of feudalism in Europe a gain or a loss to commerce ?

Why are not commercial leagues, such as the Hanse, necessary at the present time ?

Why did Spain's commerce decline as Portugal's thrived ?

COLLATERAL READING *

Gibbins's History of Commerce—Chapters IV-V.

Fiske's Discovery of America, Vol. I—Chapters IV-V.

* For a complete list of books for reference, see p. xii.

CHAPTER III

TOPOGRAPHIC CONTROL OF COMMERCE

THE great industry of commerce, which includes both the trade in the commodities of life and the transportation of them, is governed very largely by the character of the earth's surface. But very few food-stuffs can be grown economically in mountain-regions. Steep mountain-slopes are apt to be destitute of soil; moreover, even the mountain-valleys are apt to be difficult of access, and in such cases the cost of moving the crops may be greater than the market value of the products. Mountainous countries, therefore, are apt to be sparsely peopled regions.

Reasons
for sparse
population
of
mountain
regions

But although the great mountain-systems are uninhabitable, or at least sparsely peopled, they have a very definite place in the economics of life. Thus, the great western highland of the United States diverts the flow of moisture from the Gulf of Mexico northward into the central plain, and gives to the region most of its food-growing power. In a similar manner, moisture intercepted by the Alps and the Himalayas has not only created the plains of the Po and the Ganges from the rock-waste carried from the slopes, but has also made them exceedingly fertile.

Effects
of high
ranges on
rainfall

Mountain-ranges are also valuable for their contents. The broken condition of the rock-folds and the rapid weathering to which they are subjected have exposed the minerals and metals so useful in the arts of commerce and civilization. Thus, the weathering of the Appalachian folds has made accessible about the only available anthracite coal measures yet worked; and the worn folds about Lake

Contents
of
mountain
ranges

Superior have yielded the ores that have made the United States the foremost copper and steel manufacturing country of the world. Gold, silver, tin, lead, zinc, platinum, granite, slate, and marble occur mainly in mountain-folds.

Mountains and Valleys.—Mountain-ranges are great obstacles to commerce and intercommunication. The Greek peoples found it much easier to scatter along the Mediterranean coast than to cross the Balkan Mountains. For twenty years after the settlement of California, it was easier and less expensive to send traffic by way of Cape Horn than to carry it across the Rocky Mountains.

Mountains
as
obstacles
to
commerce

The deep cañons of mountainous regions are quite as difficult to overcome as the high ranges. In modern methods of transportation a range that cannot be surmounted may be tunnelled, and a tunnel five or six miles in length is no uncommon feat of engineering. A cañon, however, cannot be tunnelled, and if too wide for cantilever or suspension bridges, a detour of many miles is necessary. In crossing a deep chasm the route of transportation may aggregate ten or fifteen times the distance spanned by a straight line.

Cañons as
obstacles
to
commerce

Excepting the mining regions, the population of mountainous countries is apt to be found mainly in the intermontane valleys. A reason for this is not hard to find; the valleys are usually filled with rich soil brought from the higher slopes and levelled by the water. The population, therefore, is concentrated in the valley because of the food-producing power of the land. For this reason the Sound, Willamette, and San Joaquin-Sacramento Valleys contain the chief part of the Pacific coast population. The Shenandoah and the Great Valley of Virginia are similar instances.

Reasons
for dense
population
of valleys

What is true of the larger intermontane valleys is true also of the narrow stream valleys of mountain and plateau

regions. Thus, in the New England plateau the chief growth during the past forty years has been in the valley lands. In that time if the uplands have not suffered actual loss, they certainly have made no material gains. Upland farming has not proved a remunerative venture, and many of the farms have either been abandoned or converted to other uses.

Dense
population
of river
valleys

Passes.—Transverse valleys form very important topographic features of mountain-regions. Inasmuch as the ranges themselves are obstacles to communication, it follows that the latter must be concentrated at such cross valleys or gaps as may be traversed. Khaibar Pass, a narrow defile in the Hindu Kush Mountains, between Peshawur and Jelalabad, for many years was the chief gateway between Europe and India. Even now the cost of holding it is an enormous tax upon England.

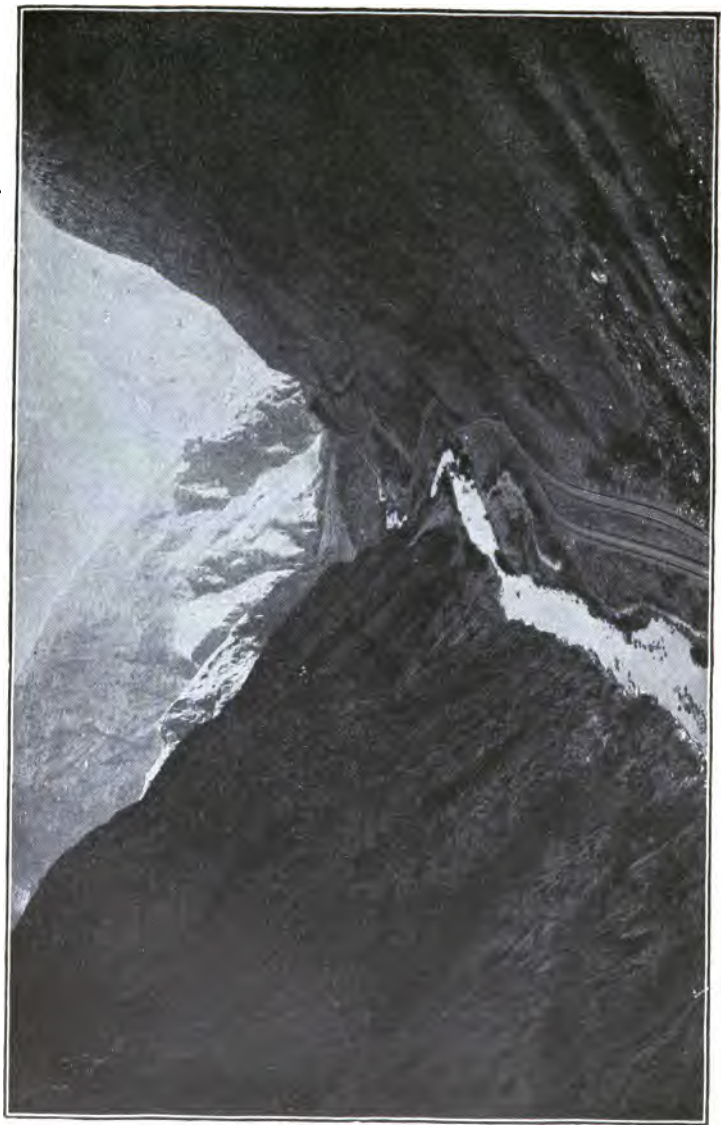
Commerce
concentrates at
mountain
passes

Brenner, St. Gotthard, and the Mont Cenis Passes are about the only land channels of commerce between Italy and transalpine Europe, and most of the communication between northern Italy and the rest of Europe is carried on by means of these passes. Every transcontinental railway of the American continent crosses the various highlands by means of gaps and passes, and some of them would never have been built were it not for the existence of the passes. Fremont, South, and Marshall Passes have been of historic importance for half a century.

Mountain
passes
traversed
by railways

The Hudson and Champlain Valley played an important part in the history of the colonies a century before the existence of the United States, and its importance as a gateway to Eastern Canada is not likely to be lessened. The Mohawk gap was the first practical route to be maintained between the Atlantic seaboard and the food-producing region of the Great Central Plain. It is to-day the most important one. It is so nearly level that the total

Hudson
Valley and
Mohawk
gap as
trade
routes



A PASS—THE ROUTE OF A RAILWAY

lift of freight going from Buffalo to tide-water is less than five hundred feet.

Rivers.—River-valleys are closely connected with the economic development of a country. Navigable rivers are free and open highways of communication. In newly settled countries the river is always the least expensive means of carriage, and often it is the only one available for the transportation of heavy goods.

Navigable
rivers as
trade
routes

In late years, since the railway has become the chief means for the transportation of commodities, river transportation has greatly declined. The river-valley, however, has lost none of its importance; in most instances it is a naturally levelled and graded route, highly suitable for the tracks of the railway. As a result, outside of the level lands of the Great Central Plain, not far from eighty per cent. of the railway mileage of the United States is constructed along river-valleys.

River
valleys as
railway
routes

Plateaus.—Plateaus are usually characterized by broken and more or less rugged surface features. As a rule they are deficient in the amount of rainfall necessary to produce an abundance of the grains and similar food-stuffs, although this is by no means the case with all.

Plateaus
deficient
in pro-
ductivity

Most plateaus produce an abundance of grass, and cattle-growing is therefore an important industry in such regions. Thus, the plateaus of the Rocky Mountains are famous for cattle, and the same is true of the Mexican and the South American plateaus. The Iberian plateau, including Spain and Portugal, is noted for the merino sheep, which furnish the finest wool known. The plateau of Iran is also noted for its wool, and the rugs from this region cannot be imitated elsewhere in the world.

Most
plateaus
arid
regions
with
grazing
products

Plains.—Plains are of the highest importance to life and its activities. Not only do they present fewer obstacles to intercommunication than any other topographic features,

Reasons
for fertility
of plains

but almost always they are deeply covered with the fine rock-waste that forms the chief components of soil. Plains, therefore, contain the elements of nutrition, and are capable of supporting life to a greater extent than either mountains or plateaus. About ninety per cent. of the world's population dwell in the lowland plains.

Productivity of
plains

The Great Central Plain of North America produces about one-quarter of the world's wheat, and practically four-fifths of the corn. The southern part of the great Arctic plain and the plains of the Baltic also yield immense quantities of grain and cattle products. The coast-plains of the Atlantic Ocean, on both the American and the European side, are highly productive.

River,
lacustrine,
and coast
plains

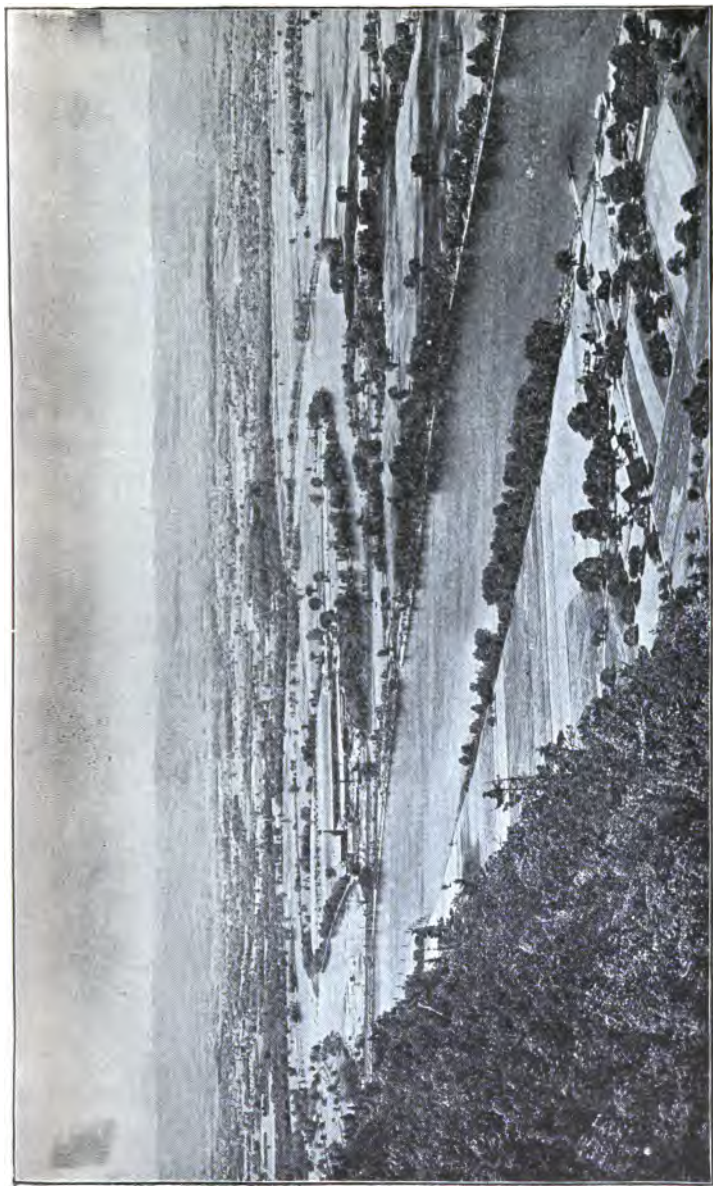
River flood-plains are almost always densely peopled because of their productivity. The bottom-lands of the Mississippi and the Yangtze Rivers are among the chief food-producing regions of the world. Lacustrine plains, the beds of former lakes, are also highly productive regions. The valley of the Red River of the North is an example, and its wheat is of a very high quality.

Reasons
for dense
population
of plains

Fertile coast-plains and lowlands that are adjacent to good harbors, as a rule are the most thickly peopled regions of the world. In many such regions the density of population exceeds two hundred or more per square mile. The reason is obvious. Life seeks that environment which yields the greatest amount of nutrition with the least expenditure of energy.

Distribution of
plains

The study of a good relief map shows that, as a rule, the Pacific Ocean is bordered by a rugged highland, which has a more or less abrupt slope, and a narrow coast-plain. Indeed, the latter is absent for the greater part. The slopes of the Atlantic, on the other hand, are long and gentle—being a thousand miles or more in width throughout the greater part of their extent. The area of productive land



A RIVER FLOOD-PLAIN—A REGION ADAPTED TO CULTIVATION

is correspondingly great, and the character of the surface features is such that intercommunication is easy.

Atlantic
slopes the
centre of
world's
commerce

The result of these conditions is evident. The Atlantic slopes, though not everywhere the most densely peopled areas, contain the great centres of the world's activities and economies. In the past 400 years they have not only overtaken the Pacific coast races, but have far surpassed them. They are now entering upon a commercial invasion of the Pacific nations that is resulting in a reorganization of the entire industrial world.

Buffalo
trails
become
trade
routes

Topography and Trade Routes.—As the settlement and commerce of a country grow, roads succeed trails, and trails are apt to follow the paths of migrating animals. Until the time of the Civil War in the United States, most of the great highways of the country were the direct descendants of "buffalo roads," as they were formerly called.

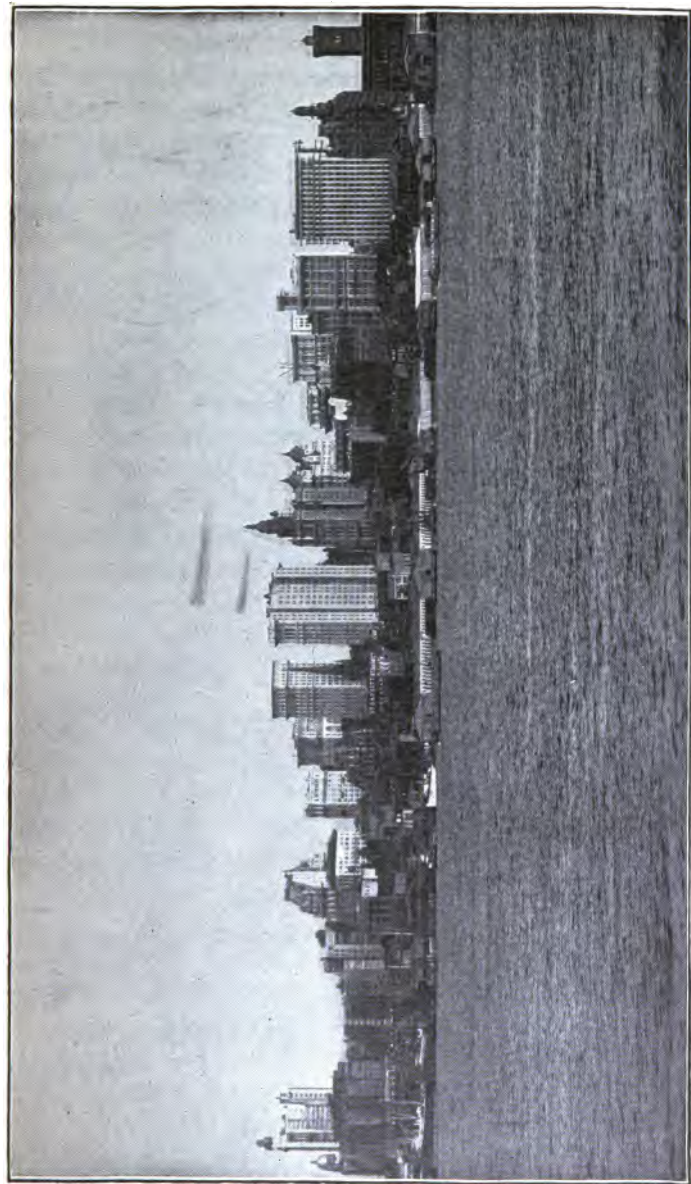
Railways
follow
buffalo
roads

In the crossing of divides from one river-valley to another, the mountain-sections of the railways for the greater part follow the trails of the bison. This is especially marked in the Pennsylvania, the Baltimore and Ohio, and the Chesapeake and Ohio railways; in some instances the tunnels through ranges have been constructed directly under the trails. The reason is obvious; the instinct of the bison led him along routes having the minimum of grade.

Why trails
of
Mississippi
valley
avoided
bottom-
lands

Throughout the Mississippi Valley and the great plains the Indian trails usually avoided the bottom-lands of the river-valleys, following the divides and portages instead. This selection of routes was probably due to the fact that the lowlands were swampy and subject to overflow; the portages and divides offered no steep grades, and were therefore more easily traversed.

Harbors.—Coast outlines have much to do with the commercial possibilities of a region. The "drowned val-



WHERE COMMODITIES ARE EXCHANGED—NEW YORK CITY WATER-FRONT

Drowned
valleys as
harbors

leys" and similar inlets along the North Atlantic coast, both of Europe and America, form harbors in which vessels ride at anchor in safety, no matter what the existing conditions outside may be. As a result, the two greatest centres of commerce in the world are found at these harbors—one on the American, the other on the European coast.

Location
of harbors
of United
States

From New York Bay southward along the Atlantic seaboard there are but few harbors, and this accounts for the enormous development of commerce in the stretch of coast between Portland and Baltimore. San Francisco Bay and the harbors of Puget Sound monopolize most of the commerce of the Pacific coast of the United States. South America has several good harbors on the Atlantic seaboard, and in consequence a large city has grown at the site of each. On the Pacific coast the good harbors are very few in number, and they are not situated near productive regions.

Harbors
of Asia
and Africa

Asiatic peoples, as a rule, are not promoters of foreign commerce and, those of Japan excepted, the only good harbors are the ones that have been improved by European governments. These are confined mainly to India and China. The many possible harbors make certain a tremendous commerce in the future. Africa has but very few good harbors. There are excellent harbors in the islands of the Pacific, and many of them are of great strategic value as coaling stations and bases of supply to the various maritime powers.

Fortunate
position of
Honolulu
and
Colombo

Position.—Geographic position in many instances governs commerce. Thus, the position of the Hawaiian Islands makes them so convenient of access that the port of Honolulu has become the principal calling port in the Pacific Ocean. Colombo, in the island of Ceylon, is particularly known as the "halfway house" from the fact that most east-bound and west-bound steamships in the Indian

Ocean trade call there. The ports of Puget Sound have grown into prominence because they are more convenient to the commerce of Japan and China than are the ports farther south on the Pacific coast of the United States.

Ports of
Puget
Sound

QUESTIONS FOR DISCUSSION

The various railways have often found it more economical to tunnel mountain-ranges rather than to haul the trains over the mountains; discuss the details in which there will be a saving.

Why are rugged and mountainous regions apt to be sparsely peopled?

The first valuable discovery in the Rocky Mountains was gold; what were the chief effects that resulted?

Would the industries of the Pacific coast of the United States be benefited or impaired by the existence of a coast-plain?

Which are more conducive to commerce—the large mediterraneans, such as the Gulf of Mexico, or the small estuaries, such as New York Bay? Discuss the merits or demerits of each.

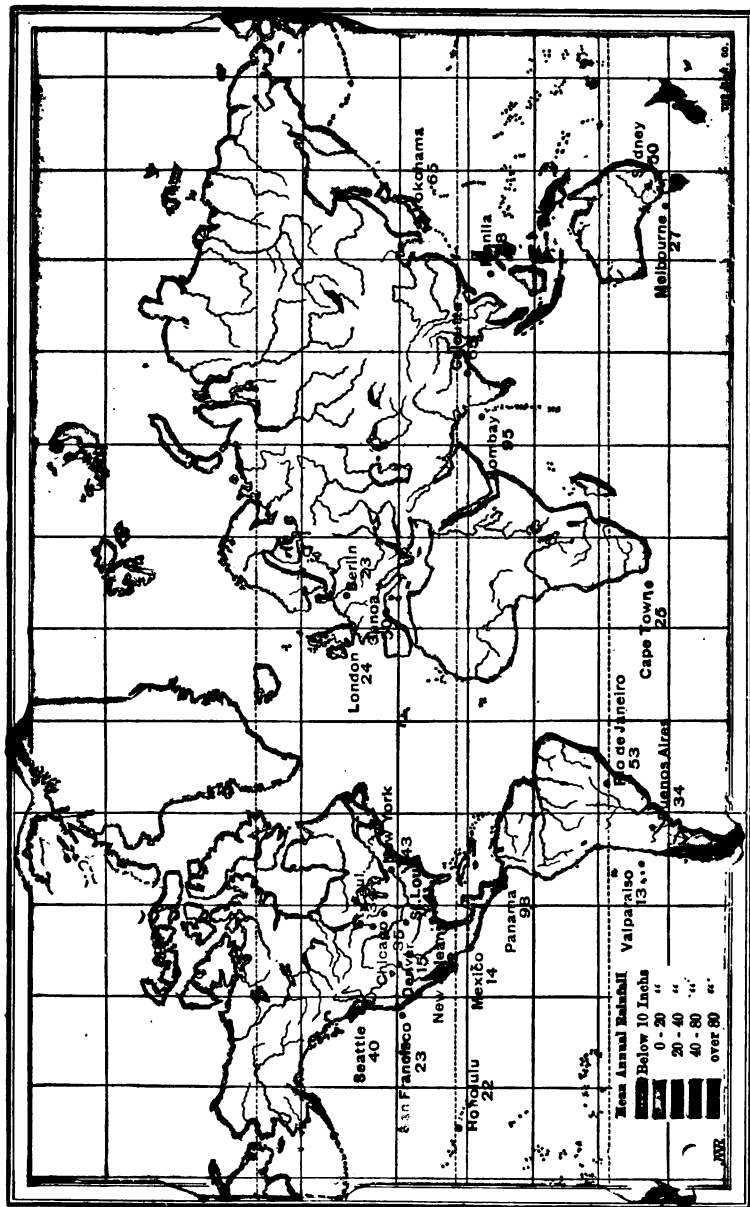
What are the chief products of mountains, of plateaus, of low-land plains?

COLLATERAL READING AND REFERENCE

Adams's New Empire—Chapter I.

Redway's Physical Geography—Chapter IV.

A topographic map of the United States.



MEAN ANNUAL RAINFALL

CHAPTER IV

CLIMATIC CONTROL OF COMMERCE

IN its effect upon life and the various industries of peoples, climate is a factor even more important than topography. Of the 53,000,000 square miles of the land surface of the earth, scarcely more than one-half is capable of producing any great amount of food-stuffs, and only a very small area can support a population of more than one hundred people to each square mile.

Proportion
of
habitable
lands

Climate and Habitability.—In the main, regions that are inhabited by human beings produce either food-stuffs or something of value that may be exchanged for food-stuffs; and inasmuch as food and shelter are the chief objects of human activity, regions that will not furnish them are not habitable.

The growth and production of food-stuffs is governed even more by conditions of climate than by those of topography. Thus the great Russian plain is too cold to produce any great amount of food-stuffs, and it is, therefore, sparsely peopled. The northern part of Africa and the closed basins of North America and Asia lack the rainfall necessary to insure productivity, and these regions are also uninhabitable. The basin of the Amazon has a rainfall too great for cereals and grasses, and the larger part of it is unfit for habitation.

Reasons
for non-
habitabil-
ity of
certain
plains

All the food-stuffs are exceedingly sensitive to climate. Rice will not grow where swampy conditions do not prevail at least during part of the year. Turf-grass will not live where there are repeated droughts of more than three

months' duration, and corn will not ripen in regions having cool nights. Wheat does not produce a kernel fit for flour anywhere except in the temperate zone; and the banana will not grow outside the torrid zone.

Effects of
tempera-
ture and
moisture
on life

The two chief factors of climate are temperature and moisture. No forms of life can withstand a temperature constantly below the freezing-point of water, and but few, if any, can endure a constant heat of one hundred and twenty-five degrees, although most species can exist at temperatures beyond these limits for a short time.

Effects of
inclination
and self-
parallelism
of earth's
axis

Zones of Climate.—The belt of earth upon which the sun's rays are nearly or quite vertical is comparatively narrow. But the inclination of the earth's axis and the fact that it is parallel to itself at all times of the year create zones of climate. These differ materially in the character of the life, forms, and the activities of the people who dwell in them.

Effects of
tempera-
ture on
life in
torrid
zone

In the torrid zone the temperature varies but little. During the season of rains it rarely falls to 70° F., and in the dry season it is seldom higher than 95° F. As a result, all sorts of plants that are sensitive to low temperatures thrive in the torrid zone. It is not a climate suitable for heat-producing food-plants, and they are not required.

Effects of
climate on
people of
torrid zone

The constant heat and excessive moisture of the atmosphere in the torrid zone is apt to produce a feeling of lassitude among the dwellers in such regions, moreover, and great bodily activity is out of question. These conditions seriously affect the lives of the people, and, with few exceptions, tropical peoples are rarely noted for energy or enterprise. Great commercial enterprises are the exception rather than the rule, and they are usually carried on by foreigners who must live a part of the time in cooler localities.

Polar regions are deficient both in the heat and light



THE EFFECTS OF HIGH LATITUDE—TOO COLD TO PRODUCE BREAD-STUFFS

Reasons
for
sparse
life
in polar
regions

necessary for food-stuffs. Neither the grasses nor the grains fructify. As a result, but few herbivora can live there, and these are practically restricted to the musk-ox and the reindeer, which subsist on mosses and lichens. The native people are stunted in growth; their food consists mainly of raw blubber, and they are scarcely above savagery.

Reasons
for tremendous
energy of
people of
temperate
zones

The temperate zones are the regions of the great industries and activities of human life. The larger part of the land surface of the earth is situated in these zones; moreover, the people who dominate the world also live in them, and their supremacy is due largely to conditions of climate. The alternation of summer and winter causes a struggle for existence that develops the intellectual faculties and results in industrial supremacy.

Reasons
for sparse
population
of high
regions

Effects of Altitude.—There is a decrease of temperature of 1° F. for about every three hundred feet of ascent. But few people live at an altitude of more than six thousand feet above sea-level, and in many cases they depend on other localities for the greater part of their food-stuffs, because very few of such regions produce food-stuffs abundantly.

Certain
exceptions

The chief exceptions to this rule are found in tropical regions. The highlands of Mexico, the plateau-regions of Bolivia and Ecuador, and the highlands of southern Asia are habitable, but they are not densely peopled. Because of their altitude they are relieved of the enervating effects of tropical climate at the sea-level.

Why high
regions are
deficient in
rainfall

Altitude likewise affects the amount of rainfall. Most plateaus are arid. As a rule, they are arid because of their altitude; and because of their aridity they are deficient in their power to produce food-stuffs. They are therefore sparsely peopled.

Effects of Rainfall.—Regions having considerably more than one hundred inches of rain annually are very

apt to be forest-covered, and therefore to be deficient in food-producing plants. Such localities have usually a sparse population, in spite of the profusion of vegetation. In some parts of India, lands that have been left idle for a few seasons produce such a dense jungle of wild vegetation that to reclaim them for cultivation is well-nigh impossible.

Reasons
for sparse
population
in regions
of
excessive
rains

A deficiency of rainfall is even a greater factor in restricting the density of population than too much rain. With less than fifteen or twenty inches a year few regions produce good crops of grains and grasses, and as a result they are sparsely peopled. Some of the exceptions, however, are important. If the rainfall is not quite enough to produce a normal overflow to the sea, the soil may be very rich, because the nutrition is not leached out and carried away.

Reasons
for sparse
population
of arid
regions

Many small areas of this character produce enormous crops when artificially watered, and many of them, such as Persia, parts of Asia Minor, northern Utah, and large areas of Australia and Chile have become regions of considerable commercial importance. The products of such regions are apt to be unique in character and of unusual value. Thus, the wool of Persia and Australia and the fruit of the Iberian peninsula are important articles of commerce.

Great
fertility of
irrigated
regions

In Egypt one may see the results of irrigated lands. The area of geographical Egypt is somewhat less than half a million square miles; the habitable part of the country is confined to a narrow strip, which, one or two places excepted, varies from three to six miles in width. In other words, almost the whole population of the country is massed in the flood-plain and delta of the Nile; the remaining part is a desert producing practically nothing.

Results of
irrigation
in Egypt

The water that makes these lands productive falls, not

in Egypt, but in the highlands of Abyssinia, 2,000 miles away. The September overflow of the flood-plain is the chief factor in the irrigation of these lands, but the area has been greatly increased by the construction of barrages and dams at Assiut and Assuan.

Results of
irrigation
in United
States

In the western highland region of the United States considerable areas already have been made productive by irrigation, and it is estimated that about two million acres of barren land can be reclaimed by impounding the waters of the various streams now running to waste.

Results of
seasonal
distribu-
tion of rain

The distribution of rain with respect to the season in which it falls is quite as important as its distribution with respect to quantity. In tropical regions the ocean winds, and therefore the rainfall, come from the east. The eastern slopes of such regions, therefore, have a season in which rains may be expected daily, and another in which no rain falls for several months. In the temperate zones seasonal rains for a similar reason are on the western coasts.

Illustra-
tions of
seasonal
distribu-
tion of
rain

Thus on the Pacific coast of the United States the rainfall varies from about one hundred inches in southern Alaska to about twelve in San Diego, Cal. Practically all the rain falls between October and the following May; very little or none falls in the interval between May and October. As a result, ordinary turf-grass, which will not withstand long droughts, grows in only a few localities of the Pacific slope. It is replaced by hardier grasses whose roots, instead of forming turf, grow very deep in the soil.

Common clover will not grow in this region unless irrigated; it is replaced by burr-clover, a variety of the plant that will not thrive in moist regions. Now the quality of the merino wool clip of California depends in no slight degree upon the burr-clover and other food-products that



CLIMATICALLY ADAPTED TO CULTIVATION—
THE LOWLANDS PRODUCE BREAD-STUFFS AND FRUIT; THE MOUNTAIN-SLOPES ARE GRAZING REGIONS

thrive in regions of seasonal rains; that is, a great commercial industry exists because of this feature of rainfall, and it could not long survive in spite of it.

Seasonal
rainfall
and Pacific
Coast
wheat
crop

The seasonal rainfall also affects other agricultural industries. The sacked wheat-crop may be left in the field without cover or protection until the time is convenient for shipping it. The absence of summer rains makes possible in California what would be out of question in the Mississippi Valley, where a rainstorm may be expected every few days.

Seasonal
rainfall
and fruit

The quality of certain fruits depends largely on the season during which the rainfall occurs. Apples, pears, and grapes grown in regions having dry summers have usually a very superior flavor. The raisin-making industry of California also depends on the same condition, because, in order to insure a good quality of the product, the bunches of grapes, after picking, must be dried on the ground. To a certain extent this is also true of other fruits, such as dates, figs, and prunes, which frequently are sun-dried.

Modifying
influence
of bodies
of water

The presence of large bodies of water, which both absorb and give out their heat very slowly, tempers the climate of the nearby land and to that extent modifies the commerce of such districts. The grape-growing industry of central New York is a great one and its product is famous. Its existence depends almost wholly upon the lake-tempered climate. Elsewhere in the State the industry is on a precarious basis, and the product is inferior.

Effects of
inclination
of earth's
axis on
produc-
tivity

Effects of Inclination of the Earth's Axis.—The inclination and self-parallelism of the earth's axis is undoubtedly a very important factor in climate. Practically it more than doubles the width of the belts of ordinary food-stuffs by lengthening the summer day in the temperate zone. Beyond the tropics the obliquity of the sun's

rays are more than balanced by the increased length of time in which they fall.

Thus, in the latitude of St. Paul, the longest day is about fifteen and one-half hours long; at Liverpool it is nearly seventeen hours long; a greater number of heat units therefore are received in these latitudes during summer than are received in equatorial regions during the twelve-hour day. Moreover, the summer temperature is higher in these latitudes than in the torrid zone, because the sun is shining upon them for a greater length of time.

Effects of long summer days on temperature

The result of these various influences is far-reaching. Because of the long summer days and short nights, wheat can be cultivated to the sixtieth parallel. Corn, which gets scarcely enough warmth and light in the torrid zone to become a prolific crop, attains its greatest yield in the latitude of fourteen-hour days.

Effects of long summer days on corn and wheat crops

These factors, it is evident, carry the grain and meat industries into regions that otherwise would not be habitable. Because the long summer days produce these great food-crops, commerce and its allied industries have reached their maximum development in these regions. Human activities are greatest in the zones bounded by the thirty-fifth and fifty-fifth parallels, the zone that includes the greater parts of the United States, Europe, China, Japan. They are greatest, moreover, because of their geographical position.

Reasons for human activities between 35th and 55th parallels

QUESTIONS FOR DISCUSSION

What would be the probable effect on the food-crops of the United States were the main body of the country moved twenty degrees north in latitude? Which would then be the wheat-growing States, the cotton-producing States?

Illustrate the connection between occupation and altitude above sea-level.

What difference would it make to the corn-crop were the days and nights always twelve hours long?

What would be requisite to make Canada a centre of silk production?

Why is not cod-fishing an industry off the east coast of Florida?

Why is the greater part of the Russian Empire destined to be sparsely peopled?

FOR COLLATERAL REFERENCE

A rain chart of the world.

A chart of isothermal lines.

CHAPTER V

TRANSPORTATION—OCEAN AND INLAND NAVIGATION

OF all the adjustments which come into the lives of a people none has been so far-reaching as the gradual localization of industries each in the region best adapted to it. For instance, manufacturing industries require power, but not fertile soil; therefore the manufacturing industries seek nearness to fuel or to water-power, and a position available for quick transportation.

Adjustment in location of industries

Farming does not require any great amount of natural power; on the contrary, level land and fertile soil are essential features. The farmer must therefore look to conditions of topography and climate, and also to the means of getting his crop to an available market.

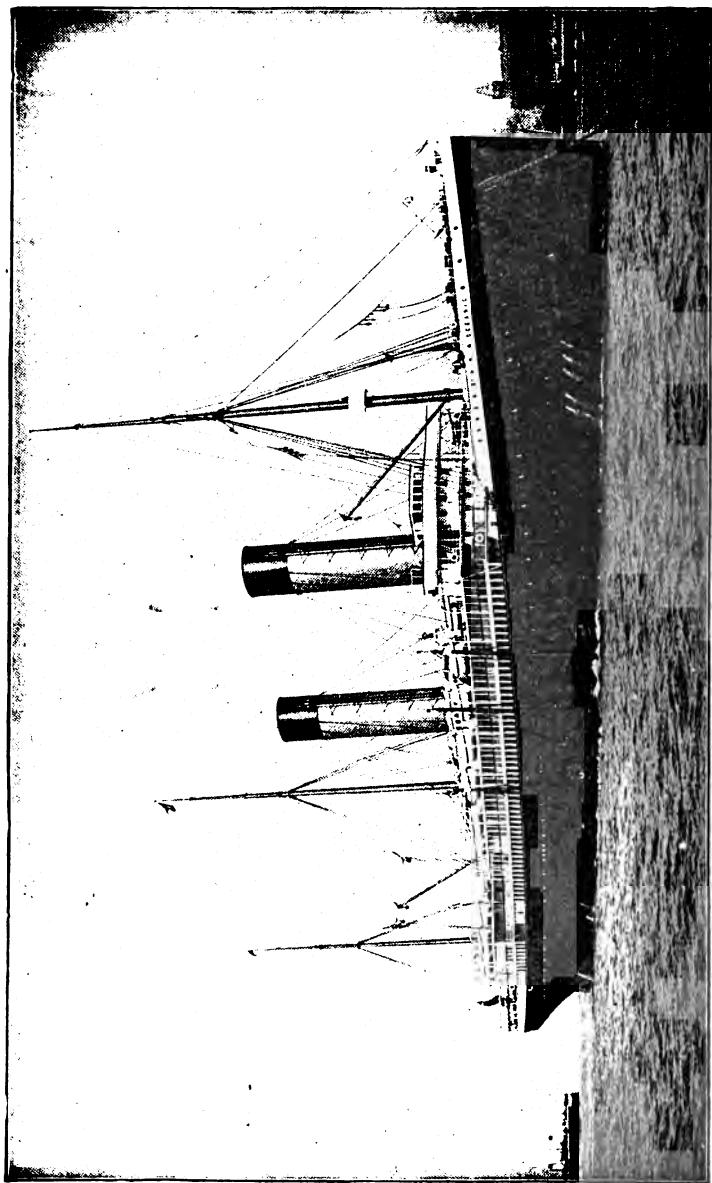
Easy transportation necessary for farm products

Mining cannot be an industry in regions destitute of minerals; the miner must therefore go where the mineral wealth is found, without regard to climate, soil, centres of population, or topography. But two things are required—the mineral products and the means of getting them to the people—that is, ready means of transportation.

Easy transportation necessary for mineral products

A century or more ago, each centre of population in the United States was practically self-sustaining. Each grew its own food-stuffs, and manufactured the articles used in the household. But very little was required in the way of transportation. The means of carriage were mainly ox-carts, pack-horses, and boats. There was a mutual independence among the various centres, it is true, but the independence was at the expense of civilization and the comforts of life.

Effects of transportation on civilization



OCEAN TRANSPORTATION.-
ROYAL MAIL STEAMSHIP OCEANIC, WHITE STAR LINE

Beyond an independence that is more apparent than real, such a plan of social and industrial organization has but little in it to commend. Intercommunication increases knowledge, and under the conditions that formerly prevailed, there was but little breadth of knowledge that comes with the mutual contact of peoples.

Effects of
intercom-
munication
on human
knowledge

The utilization of national resources, such as the productiveness of the land, the existence of iron ore, coal, copper, and other economic minerals, finally brought about the policy of a division of industries. This, in turn, made the transportation and exchange of commodities necessary; indeed without such a plan, industrial centres could not long exist.

Causes of
division of
industries

The man whose sole business is manufacture must look to others for his supply of food-stuffs and raw materials, and these are produced more economically at a distance from the centre of manufacture. Thus England must look to the United States for cotton, to the Australian Commonwealth for wool, and to New Zealand and the United States for meat. Her chief wealth is in her coal and iron, and these make the nation a great manufacturing centre. So, also, the manufacturer of New York must go to Pittsburgh for steel, to Minneapolis for flour, and to Chicago for beef.

Illustra-
tion of
location of
industries

The application of this principle is very broad; it is the foundation of all commerce, and it underlies modern civilization. For this reason the question of transportation is just as important to a community as the industries of agriculture, mining, and manufacture. Food-stuffs are of no use unless they can be transported to the people who want them; nor can peoples remain in unproductive regions unless the food-stuffs are brought to them.

Why
transporta-
tion is
necessary
to modern
living

The gross tonnage of goods is transported mainly in one or another or all of three ways—namely, by animal

Stages in
trans-
portation
of crops

power, by railway, or by water. Thus, the cotton-crop of the United States is usually transported by wagon from the plantation to the nearest station or boat-landing; by rail or by barge to the nearest seaport; and by ocean steamship to the foreign seaport.

Reasons
for
cheapness
of water
trans-
portation

Water transportation is more economical than land carriage, for the reason that less power is required to move a given tonnage through the water than on the most perfectly graded railway. Steamship freights, as a rule, are lower than those of sailing-vessels, because a steamship has more than twice the speed, and, being larger, can carry a greater tonnage. Freight rates on the Great Lakes are higher per ton-mile than on the ocean, because the vessels are necessarily smaller than those built for ocean traffic. For a similar reason, river and canal freights are higher than lake freights. Railway transportation is economical, partly because a single locomotive will draw an enormous weight of goods, and partly because of the high speed at which the goods move from point to point. Animal transportation is more expensive than any other means ordinarily employed.

Intercon-
tinental
commerce

Ocean Transportation. — In many respects, water-routes form the most available and economical methods of transportation. Intercontinental commerce must be carried on by means of deep-water vessels. Therefore an extraordinary development of ocean carriers has taken place in the past century.

Causes for
growth of
New
England
commerce

One important period of development began with the rise of American commerce. Just after the close of the War for Independence, it was found that deep-water ships could be built of New England timber for thirty-five dollars per ton, rated tonnage, while a vessel of the same burden built in Europe cost about forty-five dollars per unit of tonnage. Two types of vessels came into use—

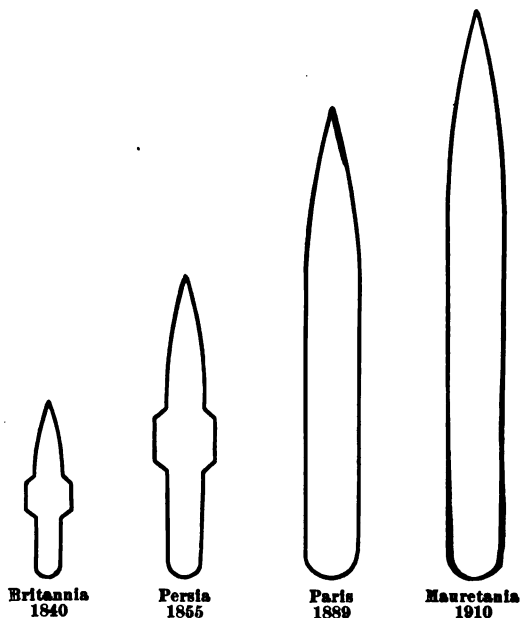


A SQUARE-RIGGED SHIP—A TYPE NOW BEING REPLACED BY FORE-AND-AFT RIGGED SCHOONERS

The
clipper
ship and
the
schooner

one, the clipper ship with square sails, was used for long ocean voyages; the other, the schooner, with fore-and-aft rigging, was employed mainly in the coast-trade.

In speed and ease of management these vessels surpassed anything that had ever sailed. In time they became



THE DEVELOPMENT OF THE MODERN STEAMSHIP

the standards for the sailing-vessels of all the great commercial nations. The types of the vessels are still standards.

The Development of the Steamship.—Another important era in ocean commerce began when steam was used as a motive power for vessels. The first deep-water vessel thus to be propelled was the *Savannah*. Her steam-power was merely incidental, however, and her paddle-wheels were unshipped and taken aboard when there was

Beginnings
of steam
navigation

enough wind for sailing. Up to 1860 almost all the ocean steamships were side-wheelers, propelled by low-pressure beam-engines.

The side-wheel steamship

The next most important improvement was the screw-blade propeller, placed astern. This means of propulsion called for higher speed of the engines, and in a very short time compactly built high-pressure engines took the place of the low-pressure engine with its heavy walking-beam. The latter carried steam at a pressure varying from twenty to thirty-two pounds; the modern boiler has steam at 260 pounds per square inch.

The screw-propeller and high-pressure engine

Ocean steamships have gradually evolved into two types. The freighter, broad in beam and capacious, is built to carry an enormous amount of freight at a moderate speed. The White Star liner Celtic is a vessel of this class; her schedule time between New York and Liverpool is about nine days. Most of the fast liners make the trip to a British port in six days or less—some of them in less than five days.*

Types of ocean steamships

Twin-screws, instead of a single propeller, are employed on nearly all the large liners. The gain in speed is not greatly increased, but the vessel is far more manageable with two screws than with one; moreover, if one engine breaks down, the vessel can make excellent time with the other.

Advantage of twin-screw steamships

Triple-expansion engines are almost universally used on modern steamships, and a pound of coal now makes about three times as much steam available as in the engines formerly used. As a result a bushel of wheat is now carried from Fargo, N. Dak., to Liverpool for about twenty-one cents—less than one-half the freight tariff of 1876.

Advantage of triple-expansion engines

* The record time of the passage between Daunts Rock, Queenstown, and Sandy Hook Light has been lowered in successive decades to less than four and one-half days; the average speed of the fastest steamships over the course of 2,800 nautical miles is nearly 25 knots.



FOUR-MASTED SCHOONER

The fastest liners consume from three hundred and fifty to more than four hundred tons of coal a day, and for each additional knot of speed the amount of coal burned must be greatly increased. Freighters like the Celtic consume scarcely more than half as much as those of the fast express steamships.

Consumption of fuel

Sailing-Craft.—In spite of the growth and development of steam-navigation, a large amount of freight is still carried by sailing-craft; moreover, it is not unlikely that the relative proportion of ocean freight carried by sailing-vessels will increase rather than decrease, especially in the case of imperishable freight.

Decline of sailing craft

The square-rigged ship, or bark, has been very largely replaced by the fore-and-aft, or schooner-rigged vessel. A large full-rigged ship requires a crew of thirty to thirty-six men; a schooner-rigged vessel needs from sixteen to twenty. These vessels are commonly built with three and four masts; some of the largest have six or seven. They carry as many as five thousand tons of freight at a speed of about ten knots—only a trifle less than that of an ordinary tramp freighter. Some of the larger vessels are provided with auxiliary engines and propelling apparatus, which enables them to enter or to leave port without the assistance of a tug. Donkey-engines hoist and lower the sails, and perform the work of loading and unloading. Such vessels are admirable colliers and grain-carriers.

Advantages of schooner-rigged craft over square-rigged vessels

At the beginning of the twentieth century, about ninety thousand sailing-craft and thirty-five thousand steam-vessels were required to carry the world's commerce. Of this number, Great Britain and her colonies register nearly thirty-five thousand, and the United States over twenty thousand.

Proportion of steam and sailing craft

HARBOR SAFEGUARDS.—Excepting the open anchorages formed by angles in coast-lines, the greater number of harbors

consist of small coves and river-mouths. In these, although there may be a considerable area of water, there is not apt to be much sailing room ; it is therefore necessary to mark off the navigable channels. For this purpose buoys of different shapes and colors are used by day ; by night fixed and flashing lights are employed.

The buoys of permanent channels are usually hollow metal cylinders or cones about two feet in diameter, anchored so that the end of the cylinder projects about three feet above the water. On entering a channel from the seaward, red buoys are on the starboard, or right hand ; white buoys are kept on the port, or left side. Buoys at the end of a channel are usually surmounted each by some device or other fastened at the upper end of a perch. Thus, at the outer entrance of Gedney Channel in New York Harbor, a ball surmounts the perch ; at the inner entrance the buoy carries a double square. Sharp angles in a channel are similarly marked. In many instances the buoy carries, as a warning signal, a bell that rings as the buoy is rocked by the waves ; in others, a whistle that sounds by the air which the rocking motion compresses within the cylinder ; still others carry electric or gas lights.

The color of a buoy is an index of its character. Thus, one with black and red stripes indicates danger ; one with black and white vertical stripes is a channel-marker. Temporary channels are frequently marked by pieces of spar floating upright. In some cases it is customary to set untrimmed tree-tops on the port, and trimmed sticks on the starboard.

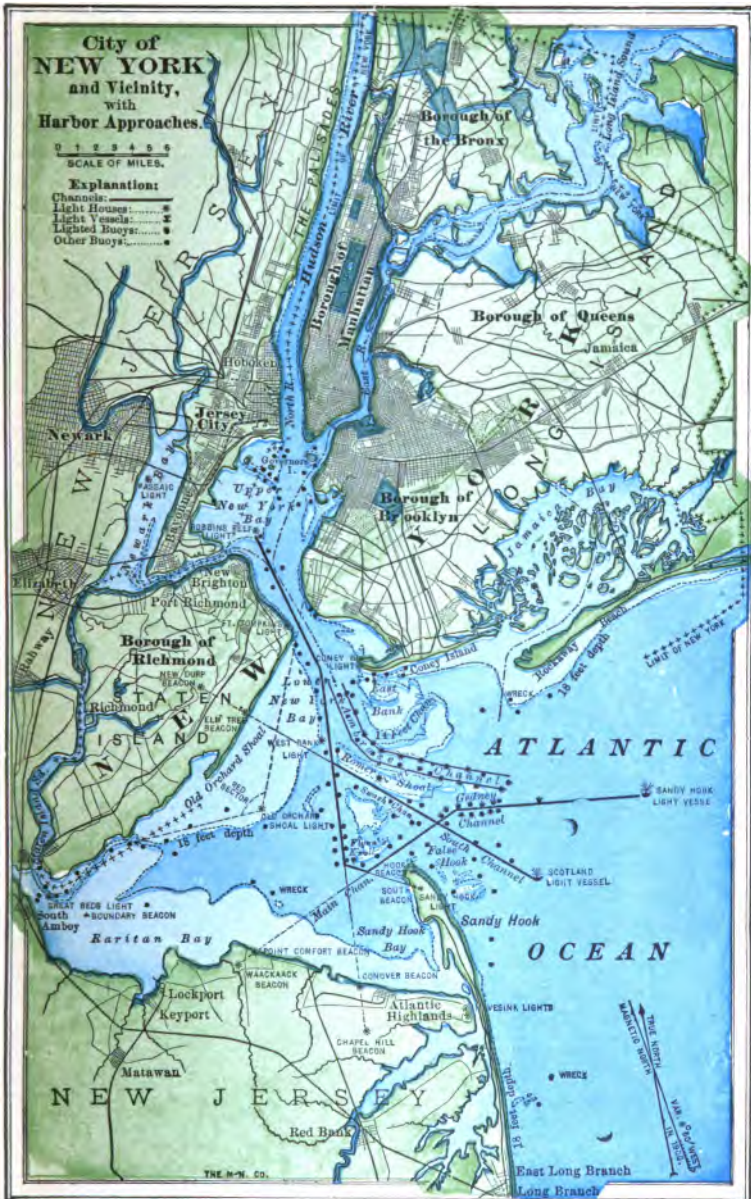
Light-houses are built at all exposed points of navigated coast-waters, and beacons are set at all necessary points within a harbor for use at night. All lights are kept burning from sunset until sunrise. The color, the duration, and the intervals of flashing indicate the position of the beacon. In revolving lights the beams, concentrated by powerful lenses, sweep the horizon as the lantern about the light revolves. Flashing lights are produced when the light is obscured at given intervals. Fixed lights burn with a steady flame. In some instances a sector of colored glass is set so as to cover a given part of a channel. Range lights, set so that one shows directly above the other, are used as channel-markers.

The use of lights may be seen as a vessel enters New York

**City of
NEW YORK
and Vicinity,
with
Harbor Approaches.**

0 1 2 3 4 5 6
SCALE OF MILES.

Explanation:
Channels:
Light Houses:
Light Vessels:
Lighted Buoys:
Other Buoys:



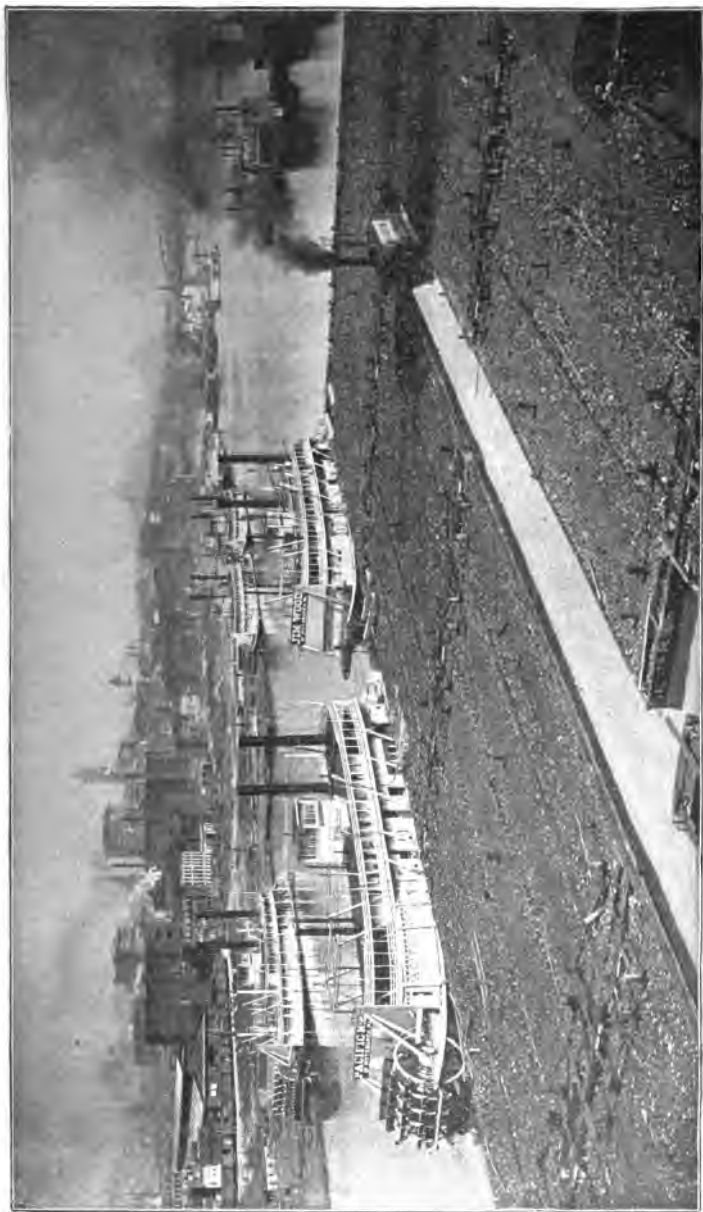
Lower Bay. A steamship drawing not more than eighteen feet of water may enter through Swash Channel (*follow the course on the chart*). In this case the pilot makes for Scotland lightship, and merely keeps New Dorp and Elmtree beacons in range, giving Dry Romer a wide berth to starboard, until Chapel Hill and Conover beacons come into range on his port side. The vessel is then held on a course between Coney Island and Fort Tompkins lights until Robbins Reef light shows ahead.

For the liners that draw more than eighteen feet the task is more difficult, inasmuch as the channel is tortuous. At Sandy Hook lightship a course lying nearly west takes the vessel to the outer entrance of Gedney Channel, marked by two buoy-lights. In passing between the lights the vessel enters the channel, which is also covered by the red sector of Hook beacon. The pilot continues between the buoy-lights until Waacaack and Point Comfort beacons are in range, and steers to this range until South Beacon and Sandy Hook light are in range astern. The helm is then turned, keeping these lights in range astern until Chapel Hill and Conover beacons are in range on the port bow. Turning northward nearly eight points, the pilot holds the bow of the vessel between Fort Tompkins and Coney Island lights, keeping sharply to his range astern, until Robbins Reef light comes into view. The opening of Ambrose Channel makes the entering of the harbor much easier.

So difficult are harbor entrances, that in most cases the underwriters will not insure a vessel unless the latter is taken from the outer harbor to the dock by a licensed pilot, and the latter must spend nearly half a lifetime as an apprentice before he receives a license. The charges for pilotage are usually regulated by the number of feet the vessel draws. The charges differ in various ports, but the devices for marking and lighting the channels are much the same in every part of the world. In the United States all navigable channels are under the control of the general Government.

Advantages of water transportation for slow freight

Inland Waters.—Lakes, rivers, and canals furnish a very important means of transportation. In Europe and Canada an enormous amount of slow freight is transported by their use; in China they are the most important means of internal traffic.



THE COMMERCE OF THE OHIO—TOWING COAL TO THE STEEL MILLS, PITTSBURG

Great
Lakes
inland
waterway

In the United States the Great Lakes with the Erie Barge Canal, now under construction, and Hudson River form the most important internal waterway. By them the continent is penetrated as far west as Duluth, a distance of more than one thousand three hundred miles. The traffic passing out of Lake Superior alone is considerably greater than that passing out of the Mediterranean Sea at the Suez Canal. Much of this traffic goes across the continent, and the route in question is one of the great commercial highways of the world.

Mississippi
River
waterway

The Mississippi River and its branches afford not far from ten thousand miles of navigable waters. Canals connect tributaries of this river with the Great Lakes at Chicago and at several points in Ohio. The development of the navigation of this great waterway was checked by the Civil War, and after the close of the war the great advance in railway building kept its improvement in the background. The general government, nevertheless, has done much to encourage the use of the Mississippi as a commercial highway, and many millions of dollars have been spent in widening and deepening its channel. On the upper river grain and lumber form the chief traffic; on the lower part a large part of the world's cotton-crop starts on its journey to the various markets.

Coal
transportation
on
Ohio
River

On account of the soft-coal fields and the steel manufacture in western Pennsylvania, the commerce of the Ohio River is very heavy, aggregating not far from fifteen million tons yearly. Much of this traffic extends to ports on the Mississippi.

Hudson
and
Delaware
transportation

The navigable parts of the Hudson and Delaware Rivers are estuaries of the sea or "drowned valleys." In each case navigation extends about to the limits of high tide. Both rivers carry a heavy freight commerce; the Hudson

has a passenger traffic of several million fares each year. Nearly every river of the Atlantic coast is navigable to the limit of high tide or a little beyond. Navigation extends to the point where the coast-plain joins the foothills. Above this limit, called the "Fall Line," the streams are swift and shallow; below it they are deep and sluggish. As a result, a chain of important river ports extends along the Fall Line from Maine to Florida.

Location
of river
ports at
the Fall
Line

Many of the rivers of Europe are connected by canals, the whole forming a net-work of navigable waters. Where they are not navigable for steamboats, the streams are canalized. Some of the smaller streams are made navigable by means of a long steel chain, which is laid along the bed of the stream; the boat engages the chain by means of heavy sprocket wheels driven by steam, and thus wind the boat up and down the river.

Canaliza-
tion of
European
rivers

Ocean steamers penetrate the Amazon Valley to a distance of one thousand miles from its mouth; boats of light draught ascend the main stream and some of its tributaries a thousand miles farther. The Orinoco is navigable within one hundred miles of Bogota. Light-draught boats ascend the tributaries of La Plata River a distance of fifteen hundred miles.

Navigation
of South
American
rivers

The Asian rivers that are important highways of commerce are few in number. The Amur, Yangtze, Indus, and Cambodia have each considerable local commerce. The Hugli, a channel in the delta of the Ganges, has a channel deep enough for ocean steamships. The tributaries of the Lena, Yenisei, and Ob have been of the greatest service in the commercial development of northern Asia from the fact that their valleys are both level and fertile.

Navigation
of Asian
rivers

Because of a high interior and abrupt slopes, the rivers of Africa are not suitable for navigation to any considerable extent; the channels are uncertain and the rivers are inter-

Obstructions to navigation of African rivers

rupted by rapids. The Nile has an occasional steamboat service as far as the "First Cataract," but in high water the service is sometimes extended farther. The Kongo has a long stretch of navigable water, but is interrupted by rapids below Stanley Pool. Similar conditions obtain in the Zambezi. The lower part of the Senegal affords good navigation. The Niger has in many respects greater commercial possibilities than other rivers of Africa. It is navigable to a distance of three hundred miles.

Canals used to connect adjacent navigable rivers

Canal locks

Canals.—Canals easily rank among the most important means of traffic, as a rule, supplementing other navigable waters. Thus, by means of an elaborate system of canals, goods are transferred by water, from one river-basin to another, so that practically all the navigable streams of western Europe are connected. Canals are extensively used to avoid the falls or rapids that separate the various reaches of rivers. The water itself by means of locks lifts the boat to a higher level or transfers it to a lower reach, thus saving the expense of unloading, transferring, and re-loading a cargo.

Canals overcome obstructions in navigable rivers

The manner in which canals supplement the obstructed navigation of a river is seen in the case of the St. Lawrence. This river is obstructed in several places by rapids, but by means of canals steamship service connects the Great Lakes, not only with Quebec, but with ports of the Mediterranean Sea as well; indeed, it is possible to send a cargo from Duluth, at the head of Lake Superior, to Odessa or Batum, on the shores of the Black Sea.

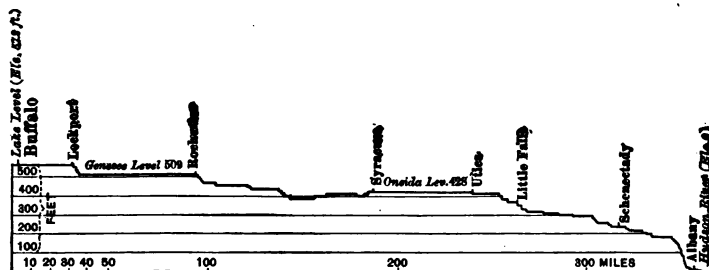
Canadian canals

The internal water-ways of Canada have been splendidly developed. The Canadian St. Marys Canal furnishes an outlet to Lake Superior for vessels drawing twenty-one feet. The Welland Canal connects Lakes Erie and Ontario. The Rideau Canal and River connect Kingston and Lake Ontario with the Ottawa, and the latter with its ca-

als is navigable to the St. Lawrence. With a population of less than six millions the Dominion Government has spent nearly one hundred million dollars in the improvement of internal water-ways.

In the United States the possible development of canals has been neglected and, to a certain extent, stifled by railway building. The Erie Canal, built before the advent of the railway, connects Lake Erie with tide-water at Albany,

Erie Canal



PROFILE OF ERIE CANAL

HORIZONTAL SCALE 100 MILES TO THE INCH, VERTICAL SCALE 1,000 FEET TO THE INCH

a distance of 387 miles. For many years it was the chief means of traffic between the Mississippi Valley and the Atlantic seaboard, and although paralleled by the six tracks of a great railway system, it is still an important factor in the carriage of grain and certain classes of slow freight.* The level way that made the canal possible is largely responsible for the decline of its importance, for the absence of steep grades enables a powerful locomotive to

* In many instances goods designed for the spring trade in the Western States are started via the canal in October, reaching their destination at Chicago some time in April, the cargo having been frozen up in one or another of the canal basins during the winter. The rate paid for this slow transit is considerably less than the amount which otherwise would have been paid for storage; moreover, it is nearly all clear profit to the canal boatmen.

Barge
canal

haul so many cars that the quick transit more than over-balances a very low ton rate by the canal. Its reconstruction as a barge canal makes it navigable for boats drawing twelve feet of water.

Chesapeake and
Ohio Canal

The Chesapeake and Ohio Canal, designed to connect the Ohio River with the Atlantic seaboard, fared much worse than the Erie Canal. No work except that of repair has been done since 1850 and its completion between Cumberland and Pittsburg is improbable.

Ohio
canals

An excellent system of canals, the Ohio and Erie with the Miami and Erie, connect the Ohio River with Lake Erie. These canals are in the State of Ohio and aggregate about six hundred miles in length. They are important as coal and ore carriers. Several hundred miles of canals were built along the river-valleys of Eastern Pennsylvania before 1840 for carrying coal to tide-water. Most of them have been abandoned; one, the Delaware & Hudson Canal Co., survives as a railway. Inasmuch as the coal went on a down grade from the mines to the markets, it could be carried more economically by railway than by canal.

Pennsylvania
canals

St. Marys
Falls Canal

Of far greater importance are the St. Marys Canal on the Canadian side, and the St. Marys Falls Canal on the American side, of St. Marys River. These canals obviate the falls in St. Marys River and form the commercial outlet of Lake Superior. The tonnage of goods, mainly iron ore and coal, is about one-half greater than that of the Suez Canal.

The Chicago Ship and Sanitary Canal,* from Lake Michigan to Lockport, on the Illinois River, was designed

* The minimum depth of the canal is 22 feet ; its width at the bottom is 160 feet. It was begun September, 1892, and completed January 2, 1902, at a cost of thirty-four million dollars. More than forty million cubic yards of earth and rock were excavated. All the bridges crossing it are movable.

mainly to carry the sewage of Chicago which, prior to the construction of the canal, was poured into the lake through the Chicago River. The completion of the canal turned the course of the river and caused the water to flow out of the lake, carrying the city's sewage. It is intended to complete a navigable water-way from Chicago to St. Louis deep enough for vessels drawing fourteen feet. Its value is therefore strategic as well as industrial, for by means of it gun-boats may readily pass from the Gulf of Mexico to the Great Lakes.

Chicago
Ship
Canal

Oceanic Canals.—Oceanic canals serve both for strategic and for industrial uses. Thus, the Kaiser Wilhelm Canal, from the mouth of the Elbe to Kiel Bay, across the base of Jutland, saves two days between Hamburg and the Baltic ports. It also enables German war-vessels to concentrate quickly in either the North or the Baltic Sea. The Manchester Ship Canal makes Manchester a seaport and saves the cost of trans-shipping freights by rail from Liverpool. The Corinth Canal across the isthmus that joins the Peloponnesus to the mainland of Greece affords a much shorter route between Italian ports and Odessa. The North Holland Ship Canal makes Amsterdam practically a seaport.

Kaiser
Wilhelm,
Man-
chester,
Corinth,
and North
Holland
Canals

Probably no other highway of commerce since the discovery of the Cape route around Africa has caused such a great change and readjustment of trade between Europe and Asia as the Suez Canal. Sailing-vessels still take the Cape route, because the heavy towage tolls through the canal more than offset the gain in time. Steamships have their own power and generally take the canal route, thereby saving about ten days in time and fuel, and about four thousand eight hundred miles in distance. In spite of the heavy tolls the saving is considerable. About three thousand five hundred vessels pass through the canal yearly.

Commer-
cial results
of Suez
Canal

Acquired
by Great
Britain

The Suez Canal, constructed by Ferdinand de Lesseps, for some time was under the control of French capitalists. Subsequently, by the purchase of stock partly in open market and partly from the Khedive of Egypt, the control of the canal passed into the hands of the English. The restrictions placed upon the passage of war-ships is such that the canal would be of little use to nations at war.



THE ROUTE OF THE PANAMA CANAL

Necessity
of Panama
Canal

The necessity of an interoceanic canal across the American continent has become more imperative year by year for fifty years. The discovery of gold in California caused an emigration from the Atlantic to the Pacific coast which resulted in a permanent settlement of the latter region. A railway across the Isthmus of Panama and another across the Isthmus of Tehuantepec have afforded very poor means of communication between oceans.

In 1881 work on a tide-level canal across the Isthmus of

Panama was begun by a French company. After spending the entire capital, about \$120,000,000, the construction company became bankrupt. In 1902, another French company was formed and from this corporation the Federal Government purchased the charter and franchises, taking control in 1904.

History

When completed, the canal will be fifty miles long, each terminal extending about five miles into deep water. The channel width of the sea-level portions will have a minimum width of not less than five hundred feet. The high level will be eighty-five feet above mean tide and will have a channel width of three hundred feet. It will be approached by three locks on each end. On the Atlantic side the locks will be at Gatun; on the Pacific side, one at Pedro Miguel and two at Miraflores. Each lock is constructed in duplicate. The canal may be used by vessels drawing not more than forty feet.

Construction

Locks

The opening of the canal will shorten the route from New York to San Francisco by 9,500 miles, to Australian ports by 3,000 miles, and to Japan and China by about 7,900 miles. It will bring San Francisco about as near to London as Calcutta is. New Orleans will be almost a neighbor to Peru and Chile.

Results in shortening of ocean routes

QUESTIONS FOR DISCUSSION

What were some of the effects which resulted from the various embargo and non-intercourse acts that preceded the war of 1812?

What is the effect upon an industry when all means of getting the products to market are cut off?

In the early history of the country rivers were the most important highways of commerce; obtain an account of some instance of this in detail.

Certain commodities have been carried about four-fifths of the distance between Moscow and Vladivostok by water, across Si-

beria. Illustrate this, using the map of the Russian Empire, plate, p. 342.

What has been the effect of cheap steel on ocean navigation?

Discuss the difference between a screw-steamship and a side-wheeler; a ship and a schooner. How are vessels steered?

How does a triple-expansion engine differ from an ordinary steam-engine?

Cargoes are carried by water across Europe from Havre to Marseilles, and from The Hague to the mouth of the Danube; illustrate the route on a map of Europe.

The following instruction occasionally is found in the pilot-house of a vessel—what is its meaning?

“Green to green and red to red—
Perfect safety; go ahead.”

From the chart on p. 49 show how a pilot uses the range lights in entering New York Harbor.

The new freighter *Minnesota* is designed to carry a load of 30,000 tons; how many trains of fifty cars, each car holding 60,000 pounds, are required to furnish her cargo?

From the map on pp. x—xi describe the new ocean routes that will be created by an interoceanic canal across the American continent.

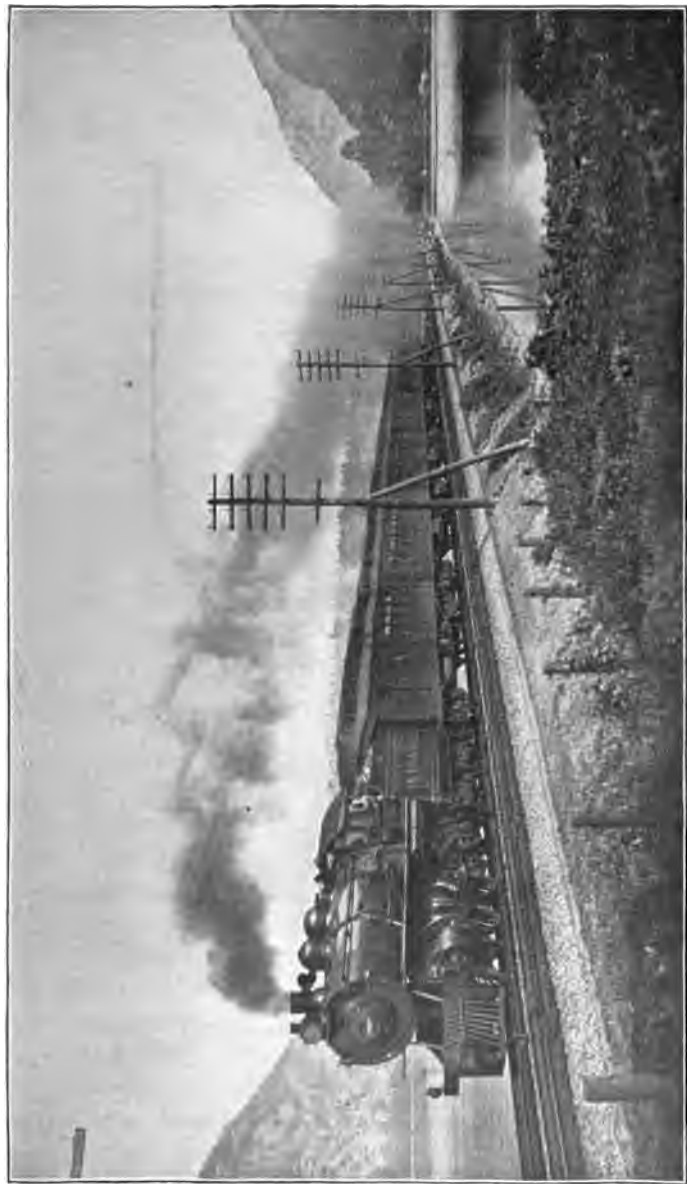
FOR COLLATERAL REFERENCE

Photographs or illustrations of various steam and sailing craft.

An Atlantic Coast Pilot Chart—any month.

A map showing the canals of the United States.

A map showing the canals of Europe.



▲ MODERN LOCOMOTIVE—THE TWENTIETH CENTURY LIMITED AT A SPEED EXCEEDING NINETY MILES AN HOUR

CHAPTER VI

TRANSPORTATION—RAILWAYS AND RAILWAY ORGANIZATION; PUBLIC HIGHWAYS

In the United States and western Europe, in spite of the low cost of water transportation, the railways have almost wholly monopolized the transportation of commodities. This is due in part to the saving of time in transit—for under the demands of modern business, the only economy is economy of time—and in part to prompt delivery at the specified time.

Reasons
for
railway
monopoly
of trans-
portation

Into a large centre of population like New York, London, or Berlin, many millions of pounds of perishable food-stuffs must be brought daily for consumption. Now these food-stuffs must be delivered with promptness, and no delay can be tolerated. A shipper having half a million pounds of meat or a hundred thousand pounds of flour or a car-load of fruit to deliver can take no risks; he sends it by rail, not only because it is the quickest way, but because experience has shown it to be the most prompt way; as a rule, the consignment is delivered on schedule time.

Necessity
for quick
transportation
of
food-stuffs

Cargoes of silks and teas from China and Japan might be sent all the way to London by water, but experience has shown a more profitable way. The consignments are sent by swift steamships to Seattle; thence by fast express trains to New York; there they are transferred to swift liners that take them across the Atlantic to European ports. And although this method of shipment is enormously ex-

Quick
trans-
portation
necessary
for high-
class
freights

pensive as compared with the all-water route, the saving of time and certainty of prompt delivery more than offset the extra cost of delivery.

In the last half of the nineteenth century the cost of haulage in the United States by rail decreased so materially that in a few instances only—notably the Great Lakes and the Hudson River—do inland waters compete with the railways.* This is due in part to better organization of the railways, but mainly to the substitution of Bessemer steel for iron rails and the great improvements in locomotives and rolling stock.

Reasons
for low
cost of
haulage

The use of a steam-driven locomotive became possible for the first time when Stephenson used the tubular boiler and the forced draught,† thereby making steam rapidly enough for a short, quick stroke. In 1865 a good freight locomotive weighing thirty tons could haul about forty box-cars, each loaded with ten tons. This was the maximum load for a level track; the average load for a single locomotive was about twenty-five or thirty cars. Heavier locomotives could not well be used because the iron rails went to pieces under them.

Capacity
of early
type of
locomotive
engines

The invention of Bessemer steel produced a rail that was safe under the pounding of a locomotive three or four times as heavy as those formerly employed; it produced boilers that would carry steam at 250 instead of 60 pounds pressure per square inch. As a result, with only a moderate increase in the fuel burned, a single locomotive on a

Results of
Bessemer
steel in
locomotive
construction

* On one great trunk system the average ton-mile rate in 1870 was one and one-seventh cents; in 1900 it was just one-half that sum.

† The modern steam-making boiler has from thirty to one hundred or more tubes passing through it from end to end. The heat from the fire-box as a rule passes under the boiler and through the tubular flues; it thus increases the heating surface very greatly. The forced draught is made by allowing the exhaust steam to escape into the smokestack, thereby increasing the draught through the fire-box.

level track will haul eighty or ninety box-cars, each carrying nearly seventy thousand pounds.*

The application of the double and the triple expansion principle has been quite as successful with locomotive as with marine engines in saving fuel and gaining power—that is, it has decreased the cost per ton-mile of hauling freight and likewise the cost of transporting passengers. Enlarged “fire-boxes,” or furnaces,† enable steam to be made more rapidly and to give higher speed.‡ Only a few years ago forty-eight hours was the scheduled time between New York and Chicago; now there are about forty trains a day between these two cities, several of which make the trip in twenty hours or less.

New
features in
fast loco-
motives

Railway Development.—The railway as a common carrier, having its right by virtue of a government charter, dates from 1801, when a tramway was built between Croydon and Wandsworth, two suburbs of London. The rails were iron straps, nailed to wooden stringers. The charter was carefully drawn in order to prevent the road from competing with omnibus lines and public cabs.

First
chartered
railway

* A single locomotive of the New York Central has hauled 4,000 tons of freight at a speed of twenty-five miles an hour. A “camel-back” of the Philadelphia & Reading hauled 4,800 tons of coal from the mines to tide-water without a helper.

† The Vanderbilt boiler with cylindrical corrugated fire-box invented by Cornelius Vanderbilt, great-grandson of the founder of the New York Central, marks an important step in locomotive building. The cylindrical form largely obviates the necessity of an array of stay-bolts to prevent warping; the corrugated surface gives greater heating power.

‡ The Central-Atlantic type of locomotive illustrates a modern improvement. The driving-wheels are placed a little forward of their usual position, while the fire-box, formerly set between the wheels, now overhangs each side of a pair of low trailing-wheels. By this means the heating surface of the fire-box is increased nearly one-half. A lever controlled by the engineer enables the latter to transfer 5,000 pounds weight from the trucks to the driving-wheels when a grade is to be surmounted. The daily run of such a locomotive is greatly increased. (*See out, p. 61.*)

When the steam locomotive succeeded horse-power, however, there followed an era of railway development that in a few years revolutionized the carrying trade in the thickly settled parts of the United States and Europe. Short, independent lines were constructed without any reference whatever to the natural movement of traffic. There seemed but one idea, namely, to connect two cities or towns. Indeed, the absence of a definite plan was much similar to that of the interurban electric roads a century later; local traffic was the only consideration.

Independent
competing
lines

At first an opinion prevailed that the road-bed of the railway ought to be a public highway upon which any individual or company might run its own conveyances, on the payment of a fixed toll; indeed, in both Europe and the United States, public opinion could see no difference between the railway and the canal. The employment of a steam-driven locomotive engine, however, made such a plan impossible, and demonstrated that the roads must be thoroughly organized.

Steam
locomotive
engines
compel
reorganiza-
tion of
railways

At the close of 1850 there were nearly four hundred different railway companies in England; in the United States about a dozen companies were required to make the connection of New York City and Buffalo. A few of these paid dividends; a large majority barely met their operating expenses, defaulting the interest on their bonds; a great many were hopelessly bankrupt.

Results of
independ-
ent
railway
building

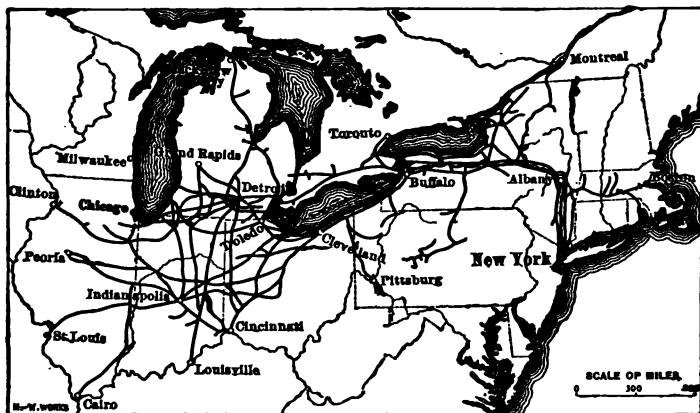
Consolidation of Connecting Lines.—Between 1850 and 1865 a new feature entered into railway management, namely, the union of connecting lines. This was a positive advantage, for the operating expenses of the sixteen lines, now a part of the New York Central, between New York and Buffalo were scarcely greater than the expenses of one-third that number. The service was much quicker, better, and cheaper. In England the several hundred

Organi-
zation of
New York
Central as
a trunk
line

companies were reduced to twelve; in France the thirty-five or more companies were reduced to six in number.

Extension
of trunk
lines into
new
territory

The consolidation of connecting lines brought about another desirable feature—the extension of the existing lines.* The lines of continental Europe were extended eastward to the Russian frontier, and to Constantinople; then the Alps were surmounted. In the United States railway extension was equally great. The Union and Central Pacific railways



A TRUNK SYSTEM—

THE VARIOUS BRANCHES EXTEND INTO COAL, GRAIN, IRON, CATTLE, TIMBER, AND TOBACCO REGIONS

were opened in 1869, giving the first all-rail route to the Pacific coast. Other routes to the Pacific followed within a few years, one of which, the Canadian Pacific, was built from Quebec to Vancouver.

* A line from Vienna to Trieste was opened about 1854; Germany was joined to Italy across Brenner Pass in 1868; France was connected with Italy through a tunnel near Mont Cenis in 1871; in 1882 the traffic of Germany was opened to Mediterranean ports by a tunnel under St. Gothard. In this manner trunk systems have gradually developed.

The period from 1864 was one of extensive railway building both in the United States and Europe. Some of the roads, such as the transalpine railways of Europe and the Pacific roads of the United States, were greatly needed. Others that created new fields of industry by opening to communication productive lands were also wise and necessary; the lands would have been valueless without them. Not a few lines that were to be needed in time were built so far ahead of time that they did not even pay their operating expenses for many years.

New fields
of industry
result
from
extension
of lines

Another class of roads was intended for speculative purposes. Thus, there were instances in which a line occupying a given territory had antagonized its patrons by poor service, and extortionate charges. Thereupon another company would obtain a charter—which was then easily done—and build a competing line in the same territory, the former most likely having scarcely enough business for one road.* The results were almost always the same; a war of rate-cutting followed; the stockholders lost heavily; and one or both roads went into the hands of receivers.

Piracy of
speculative
railways

Competition and Pools.—In many instances the consolidation of roads, while cutting off disastrous competition in the territory jointly occupied by the two roads, brought the consolidated road into fierce competition with another adjacent system. If the roads had practically the same territory but different terminals the competition was confined mainly to local traffic. On the other hand, they might have the same terminals but cover different local territories; in this case the roads must compete for

Effects of
compe-
tition

* The building of the West Shore Railroad is an illustration. After both roads had suffered tremendous losses the New York Central settled the matter by purchasing the West Shore. This was one of a great number of similar cases both in the United States and Europe.

Examples
of compe-
tition

through traffic. Thus the Chicago, Burlington & Quincy is brought into competition with the Union Pacific in Nebraska, but inasmuch as the roads have different and widely distant terminals, their local traffic is easily adjusted. The Chicago, Burlington & Quincy and the Northwestern have common terminals at Chicago, St. Paul, Denver, Omaha, and Kansas City. They must therefore compete with each other, and with half-a-dozen other roads for their through traffic.

Railways
must
operate
or lose
charters

Competition between railways differs greatly from that between two firms. If one of two firms cannot afford to compete, the manager may discharge his help, and close doors; he then does not suffer actual loss. But a railway, being a common carrier, cannot do this; the road must keep its trains moving or lose its charter. If it cannot carry goods at a profit it must carry them at cost or at a loss. Even the latter is better than not carrying them at all, for the operating expenses of the road must go on.

Evil effects
of rate-
cutting

So between 1870 and 1880 most of the railway managements were busy devising ways to stop a rate-cutting and competition that was ruinous. In many instances great trunk lines would have consolidated had not State laws prevented. They could not maintain rates because one or more of the weaker roads would be compelled to lower their rates in order to meet their operating expenses. Therefore they were compelled to do one of three things, namely, to divide the territory, to divide traffic, or to divide earnings. Either of the two latter plans is called a *pool*.

What
constitutes
a pool

Results of
pooling

Of these two forms of pooling the division of the traffic is the easier, but it is very unsatisfactory to the patrons of the road. The second plan, the division of the earnings, is a more difficult matter to adjust because each road is usually dissatisfied with its proportion. As a matter of

fact, however, the first plan of pooling is very apt to grow into the second.

In several instances pools have been declared illegal by the courts, but, in general, railway service has been more satisfactory under the pool system than under any other. Pools have always aroused popular suspicion, however, from the fact that they increase power of the railway itself. In various instances important trunk lines have formed a general company, each having its separate organization, because they could accomplish under a combined organization what they could not as independent companies. The restrictions against pooling have therefore encouraged combination of competing lines.

Restriction
of pools
causes
combina-
tion of
lines

Regulation of Rates.—The railway is an absolute necessity, and as it has power given neither to individuals nor to other corporations, both the State and general Government reserve the right to regulate its rates, and should in every way prevent unjust discrimination. Both problems are very difficult, however, and the unintelligent adjustment of rates has frequently resulted in injustice both to the roads and their patrons.

States and
Federal
Govern-
ment may
regulate
rates

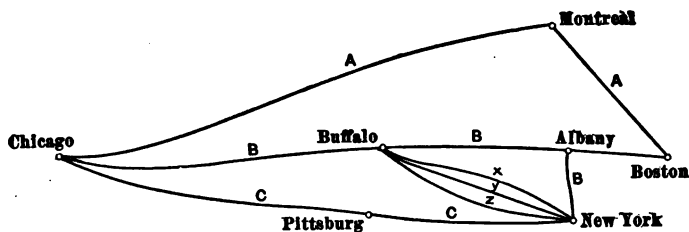
A rate per ton-mile for each class of freight is out of question, because a large part of the cost to the company consists in loading, handling, and storing the goods. Once aboard the car, it costs but little more to carry a ton of freight one hundred miles than to move it one mile. The rates per mile, therefore, are necessarily greater for short distances than for long runs. A mile-rate based on a ten-mile haul would be prohibitive to the shipper if applied to a run between Chicago and New York. On the other hand, were the charges based on the long run, the local rates would be far less than the cost of the service.*

Theory of
the ton-
mile rate

*In Great Britain the ton-rate is about \$2.30 per hundred miles; in Germany, \$1.75; in Russia, \$1.30; in the United States, \$0.70. The difference is due as much to the length of distance hauled as to economical management.

Results of
classifica-
tion of
freights

As a result freight rates are based very largely on the cost of the service, and this is particularly true of local freights. This practice is also modified by charging *what the traffic will bear*, and, on the whole, a combination of the two ideas gives the most reasonable and the fairest method of basing charges. Thus, a car filled with fine, crated furniture, which is light and bulky, can afford a higher rate than one filled with scrap-iron. Cars filled with grain, lumber, coal, or ore are made up in train-loads, and form a part of the daily haul; they can afford to be taken at a lower rate than the stuffs of which only an occasional car-load is hauled. In order to adjust this problem it is customary to divide freights into six general classes.



THE PROBLEM OF FREIGHT RATES

A problem
in freight
rates

In handling through freights the problems are many, and, if two or more roads have the same terminal points, a great deal of friction of necessity results. The longest roads must either make their through rates lower than local rates between distant points, or lose much of their through business. They cannot afford to do the latter and the statutory laws may forbid the former. As a result the laws most likely are evaded, or else openly disobeyed.*

* Thus, A, B, and C are roads whose chief terminal points are Chicago and New York City. The road C is the shortest of the three lines, but its grades are very heavy. B is, say, one hundred miles longer, but has no

The difficulties in adjusting the matter of the long and the short haul, as has been shown, have caused the formation of pools and various other traffic associations, the object of which has been to prevent rate-wars. To this ex-

Long
hauls and
short hauls

heavy grades. A is a very indirect route, and its New York traffic must be trans-shipped at Boston, or perhaps at New London, and sent a part of the way by water. If now an absolute ton-mile rate is fixed for either road, it is evident that neither of the others can carry through freight without altering rates. If C fixes a rate, then A and B must either charge higher rates between Chicago and Montreal, or Chicago and Albany, than between their terminals. Of the three roads B, on account of easy grades, is in the best position to fix rates. It therefore makes, not the lowest rate, but the one that will yield the best returns. C conforms to this, and A takes what it can get, hauling at a very small profit. But if A happens to be outside of the limits of the United States, it may openly cut rates, because pretty nearly all the through freight it gets is clear profit, and inasmuch as none of the laws of a State apply to the Canadian portion of the road, it may do what the others cannot. And while B is struggling with A, the three roads X, Y, and Z are perhaps endeavoring to have some of the freight sent from Buffalo eastward over their own lines. In instances similar to the foregoing it is customary for B and C to divide the through business and to allow a "differential" to A—that is, on account of its slower delivery of through freight, to carry it at a slightly lower rate. B then adjusts its traffic with X, Y, and Z in a similar manner; and on the whole this is the fairest way to all concerned. The law now requires each railway to publish its rates, and the latter cannot be changed except by giving thirty days' notice.

The following, one of many instances, shows the difficulties in fixing rates that will not be unjust to either party: Danville and Lynchburg compete for a certain trade. The Southern Railway passes through both cities, but the Chesapeake & Ohio makes Lynchburg by another route; Danville, therefore, is not a competing point, while Lynchburg is. As a result, the Southern Railway charged \$1.08 for a certain traffic from Chicago to Danville and only 72 cents to Lynchburg, some distance beyond, this being the rate over the other road. The matter finally reached the Court of Appeals, and the latter sustained the Southern Railway. The rate to Danville was shown to be not excessive, but if the railway were required to maintain a rate to Lynchburg higher than 72 cents, it would lose all its traffic to that point, amounting to \$433,000 yearly. In a case of this kind there can be no help except by a consolidation of the two roads; by virtue of the consolidation all the Lynchburg freight will then go over the line having the easiest haul.

Unwise
legislation
and com-
bination of
competing
lines

tent they resulted in positive good, for a rate-war in the end is apt to be as hurtful to the community as to the railway company. The attempt to settle such questions has also resulted in a great deal of legislation. Some of this has been wise and good; but not a little has been hurtful both to the railroads and to the community. The general result is seen in the great combination of competing lines and, more recently, of competing systems.

Local
passenger
rates

Passenger Service.—Passenger traffic is more easily managed than the movement of freight. For the greater part the rates are fixed by law. On a few eastern roads local rates are two cents per mile; in the main, however, a three-cent rate prevails, except that in sparsely peopled regions the rates are four and five cents per mile. On many roads 1,000-mile books are sold at the rate of twenty dollars; on some the rate is twenty-five dollars per book.

Joint rates

Long-distance rates involving passage over several roads are somewhat less than the local rates. These rates are determined by joint passenger-tariff associations. Each individual road fixes its own excursion and commutation rates; one or another of the joint passenger associations determines the rates where several roads divide the traffic. The latter are usually one, or one and one-third fares for the round trip.

Methods
of
passenger
rate-
cutting

Except on a few local roads in densely peopled regions the passenger service is much less remunerative than freight business, and not a few railways would abolish passenger trains altogether were they permitted to do so. Rate-cutting between competing roads has not been common since the existence of joint passenger associations. It is sometimes done secretly, however, through the use of ticket-brokers, or "scalpers," who are employed to sell tickets at less than the usual rate; it is also done by the illicit use of tickets authorized for given purposes, such as

“editors’,” “clergymen’s,” and “advertising” transportation. This abuse, however, has been generally suppressed.

In many instances, where several roads have the same terminal points, it is customary for the road or roads having the quickest service to allow a lower rate to the others. Thus, of the seven or eight roads between New York and Chicago, the two best equipped roads charge a fare of twenty dollars on their ordinary, and a higher rate on their limited, trains. Because of slower time the other roads charge a sum less by two or three dollars for the same service. This cut in the rate is called a “differential.”

Passen-
differ
entials

Railway Mileage.—The railways of the world in 1912 had an aggregate of six hundred and forty thousand miles, distributed as follows:

America	327,000
Europe	208,000
Asia	63,000
Australasia	23,000
Africa.....	19,000

In western Europe and the eastern United States there is an average of one mile of railway to each six or eight square miles of area. In these countries railway construction has reached probably its highest development, and the proportion seems to represent the mileage necessary for the commercial interests of the people.

Proportion
of mileage
to area

In 1910 the railways of the United States aggregated 238,000 miles—nearly one-half the mileage of the world. Over this enormous trackage 60,000 locomotives and 2,300,000 coaches and cars carry yearly 900,000,000 passengers and 1,700,000,000 tons of freight. They represent an outlay of about \$15,000,000,000 and their net earnings are nearly \$1,000,000,000 per year, or about \$4,000 per mile of track. In the ten years ending 1909, the revenue per ton mile increased from 73 cents to 76½ cents. In

Railway
statistics of
United
States

sixteen years, ending 1910, the net earnings per mile were doubled.

Owing to the absence of the international problems that have greatly interfered with the organization of European railways, the roads of the United States have developed "trunk-system" features to a higher degree than is found elsewhere.

Trunk
line
features



THE DISTRIBUTION OF THE RAILWAYS OF THE UNITED STATES
THEIR POSITION DEPENDS ON THE PRODUCTION OF THE LAND

In the United States and Canada the farms of the great central plain, together with the coal-mines, are the great centres of production, while the sea-ports of the two coasts form great centres of distribution. Most of the trunk lines, therefore, extend east and west; of the north and south lines only two are important. The reason for the east-west direction of the great trunk lines is obvious; Europe and Asia, the great markets of North America, lie respectively to the east and the west.

Reasons
for
east-west
direction
of trunk
lines

Railway Ownership.—The ownership of railways is vested either in national governments or else in corporate companies; in a few instances only are roads held individually by private owners, and these are mainly lumber or plantation roads. Thus, the railways of Prussia are owned by the state; most of those of the smaller German states are owned either by the state or by the empire; still others are owned by corporate companies and managed by the imperial government. In their management military use is considered as first in importance.

State
railways
in
Germany

In France governmental ownership and management have been less successful. Plans for an elaborate system of state railways failed, and the state now owns and operates only 1,700 miles, mainly in the southwest. Belgium controls and operates all her lines, but as the latter are short and the area of the state small, there are no difficulties in the way of excellent management. In Great Britain all the railways are owned and controlled by corporate companies. The great transcontinental line of the Russian Empire was built by the government, but the latter does not own it.

In France

In
Belgium

Corporate
ownership
in Great
Britain

In the United States the railways are now owned by corporate companies. Some of the western roads were built by Government subsidies;* other roads were built by the aid of States, counties, or cities, which afterward sold them to corporate companies. The first transcontinental railways required Government assistance, and could

Corporate
ownership
in United
States

Subsidies

* That is, the Government pledged its credit for the money borrowed, and in addition gave the companies alternate sections of public land on both sides of the proposed line, the land-grants being designed partly to encourage immigration and partly to increase the building funds of the various companies. In several instances both the land-grants and the money subsidies were scandalously used. At least one road used its earnings to build a competing line and, after disposing of the land-grant and pocketing the proceeds, allowed the Government to foreclose the mortgage and sell the original road.

not have been built without it; nowadays, however, corporate companies find no difficulty in providing the capital for any railway that is needed.

Inasmuch as the railway is a positive necessity, upon whose existence depends the transportation of the food daily required in the great centres of population, the charter of the railway gives the company extraordinary powers. Most steam railway companies are permitted by the State to exercise the power of *eminent domain*—that is, they may seize and hold the land on which to locate their tracks and buildings, if it cannot be acquired by the consent of the owners; they may also seize coal and other materials consigned to them for shipment if such materials are necessary to operate their lines.

Therefore, in consideration of the unusual powers possessed by the companies, the Federal Government and the various States reserve the right to regulate the freight and passenger tariffs. They may also compel the companies to afford equal facilities to all patrons, and take the measures necessary to prevent discrimination.

The control of the railways by the government may be absolute, as in the German state of Prussia; or it may consist of a general supervision, as in the case of the Canadian railways. In almost every European state there is a director or else a commission to act as a representative between the railways and the people. In the United States the various States have each a railway commission, while the Federal Government is represented by the Interstate Commerce Commission.

Federal Regulation of Railways.—Between 1880 and the end of the century scandalous practices had crept into the relations between railways and shippers. Certain shippers began by demanding special rates. With this advantage they were able to drive their competitors out of busi-

Rights of
eminent
domain

State and
Federal
control

Forms of
State
control

Federal
regulation
in United
States

ness. In a short time the large shippers began to demand other concessions and privileges under penalty of diverting their business to other roads. This practice grew until many of the great corporations acquired a monopoly of the food-stuffs and commodities of life, and were able to fix the prices as they pleased.

Concessions to large shippers

In 1890 an act popularly known as the "Sherman Anti-trust Law" was passed. This act made illegal all combinations and agreements that might restrain freedom of trade or tend to prevent open competition. As an unforeseen result, many of the railway pools were forced to disband. The giving of rebates to favored shippers was another result. In a short time rebate-giving in one form or another became very general among nearly all roads. As one traffic manager openly testified—"Only greenhorns and little shippers pay the schedule freight rates."

Sherman Anti-trust Law defines illegal combinations

Matters went from bad to worse and so, in 1903, the Elkins Law was passed. This law forbade not only rebates, but also forbade making rates that might discriminate between shippers or between localities. It also enlarged the powers of the Interstate Commerce Commission. About the only change noticeable was the fact that the rebates were paid secretly in one form or another. The following devices were frequently followed:

Elkins Law forbids rebates

A tariff schedule would be issued at midnight; a shipper would thereupon deliver a certain number of carloads to the railway. This done, another tariff schedule would be issued at the former rates.

Methods of secret rebates

Fictitious damages in transit would be allowed regularly to favored shippers.

Private cars owned by favored shippers would be credited with a very high rate for mileage.

Goods would be placed in a class paying lower rates for a favored shipper, the bill of lading being falsified.

The railway would pay the cartage on goods carried from the freight station for one shipper but not for another.

The railway would fail to provide cars for one shipper, while furnishing them to a favored shipper. This practice forced a number of coal mining companies into bankruptcy.

Methods
of secret
rebates

The railway would sidetrack "hurry" shipments in order to force consignees to purchase supplies of favored shippers.

"Microscopic" railway companies were organized. These were side tracks a mile or two in length built by a manufacturer or producer. The latter would then demand a portion, usually from ten to twenty-five per cent., of the entire freight rates to the destination of the shipments. The competitors of the shipper of course received no part of the rate.

A shipper with the connivance of the railway would underbill his consignment—way-billing, say, four hundred barrels of flour, but actually sending five hundred.

Hepburn
Law

Commerce
Court

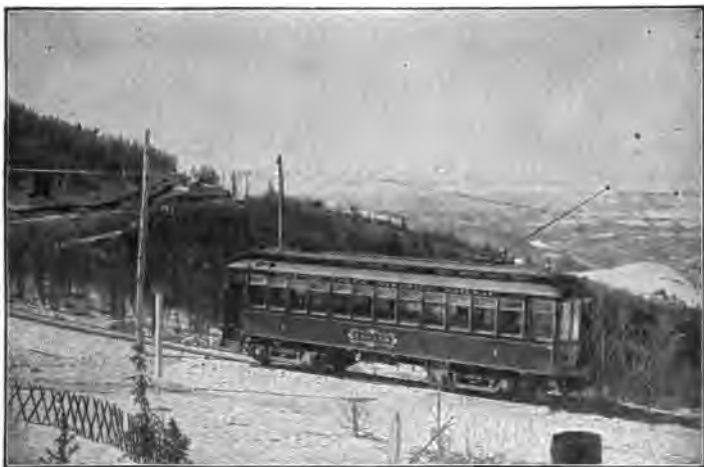
The prosecution and punishment of offenders by the Federal authorities was so vigorous that at the end of 1910 the practice of rebating was pretty nearly broken up. The Hepburn Law gives the Interstate Commerce Commission the power to adjust and fix rates where the latter are shown to be unjust. The creation of a Commerce Court now enables both the railway and the Interstate Commerce Commission to have trials of such cases as may come between them carried on without delay.

Federal
and State
regulation
of rates

Little by little, therefore, the Federal Government has gradually assumed the right to regulate rates, to prevent discrimination, and to examine financial relations between interstate railways and their patrons. The State possesses similar rights in the case of a railway wholly within the State.

Electric Railways.—The use of electricity as a motive power has not only revolutionized suburban traffic but it has become a great factor in rural transportation as well. The speed of the horse-car rarely exceeded five or six miles per hour, while that of the electric car is about ten miles per hour in city streets and about twice as great over rural roads. As a result, the suburban limits of the

Greater
speed of
electric
railways



ELECTRIC RAILWAY—ROCKY MOUNTAINS

large centres of population have greatly extended, and the population of the outlying districts has been increased from four to ten fold.

From some of the larger cities the electric roads reach out to distances of one hundred miles or more and have become the carriers of perishable freight, such as fruit and dairy products. These are not only delivered just as promptly as though they were sent over the steam roads, but the delivery is more frequent. Indeed, the marvel-

Frequent
delivery
of
perishable
freight

lous success of the electric interurban railway is due mainly to the frequency of its service.

In the ten years ending 1910, long distance electric railways were greatly extended. It is now possible to go from New York City to Boston or Portland, Maine; from Albany to Detroit or Chicago; and from Cincinnati to Chicago, Indianapolis, Cleveland, Toledo, or Louisville by

Develop-
ment of
interurban
electric
roads



ELECTRIC FREIGHT LOCOMOTIVE—ERIE RAILROAD

the electric railway. These roads are not organized to carry on trunk line business, and many of them are not permitted to carry freight. The fares of the electric railways of the Mississippi Valley average about one and one-half cents per mile; on the eastern roads the fares are about two cents per mile.

Low
fares on
electric
railways

Automobile Cars.—From a questionable experiment at its beginning, at the end of the century the automobile,

gasoline-driven car became an economic necessity in the country as well as in the city. In the city the upkeep of the automobile car is materially less than that of a horse and carriage. In the country and village it is somewhat greater. But the gasoline car can be driven at an average speed of fifteen miles per hour with perfect safety; while on long strips of well-built road a speed of twenty-five miles an hour can be safely maintained.

Advantages of automobile cars

Because of these economic features the "auto," as it is commonly called, has become a necessity in many kinds of business. The farmer finds it preferable to the ordinary buggy, and the city truckman easily takes a load of five tons through six inches of snow. About one million gasoline-driven cars were in use in 1913. The Union Pacific and the Buffalo, Rochester, and Pittsburgh railway companies find gasoline-driven passenger coaches more economical than either steam or electricity for local traffic on some of their short branch lines.

Advantages of auto-trucks and railway auto-cars

Public Roads and Highways.—Carriages propelled by electric or by gasoline motors have therefore become an important factor in the delivery of goods in nearly every city of Europe and America; but they are economical only on good roads. The bicycle, no longer a plaything, exerted a very decided effect on transportation when the "pneumatic" or inflated rubber tire came into use. Through the bicycle came the demand for good roads; and several thousand miles of the best surfaced roads are built in the United States each year.

Relation of pneumatic tires and good roads

The ordinary highways or roads, the paved streets of the large cities excepted, are popularly known either as "dirt" roads or "macadamized" roads, the latter name being applied to about every sort of graded highway that has been surfaced with broken rock. Most of the roads of western Europe are of this character. They are laid out

Macadamized public roads

with easy grades, and a thick foundation of heavy stone is covered with smaller pieces of broken rock, the whole being finished off with a top-dressing of fine material. Once built, the expense of keeping them in good order is less than that of keeping a dirt road in bad order.

Heavy
cost of
haulage
over dirt
roads

Most of the country highways of the United States are dirt roads that are deep with dust in dry weather and almost impassable at the breaking of winter. Roads of this character are such a detriment that grain-farming will not pay when the farm is distant twenty miles or more from the nearest railway. Many a farmer pays more to haul his grain to the nearest railway station than from the railway station to London.

Economy
of good
public
highways

Since it has become apparent that the commercial development of many agricultural regions depends quite as much on good wagon roads as upon railways and expensive farming machinery, there has been a disposition to grade and rock-surface all roads that are important highways. Intercommunication becomes vastly easier; the cost of transportation is lessened by more than one-half; and the wear and destruction of vehicles are reduced to a minimum. In every case the improvement of the road is designed to increase traffic by making a given power do more work in less time.

Massa-
chusetts
plan of
good-roads
building

In the improvement and rebuilding of public roads, the Massachusetts plan has been very generally adopted. Certain centres, usually the larger cities and towns, are designated and from these the State roads are extended in various directions, each being extended ten miles or more each year. There are now many thousand miles of excellent turnpike roads in operation and the mileage is rapidly increasing. Most of these are of the macadamized style, or else surfaced with concrete. To protect them from the excessive wear of automobile cars, it is customary to

surface such roads with a coating of liquid tar mixed with sand.

QUESTIONS FOR DISCUSSION

What have been the effects of Bessemer steel on the carrying power of railways?—on cheapening freight rates?

What would be some of the effects first apparent were a large city like London or New York suddenly cut off from railway communication?

What is meant by a tubular boiler?—by a forced draught?—by a switch?—by an automatic coupler?

Ascertain from a railway official the various danger-signals as indicated by lights, flags, and whistle-blasts.

Why should not crated furniture and coal have the same freight rate?

What is meant by a pool?—by long haul and short haul?—by rebate?

If the rate on a given weight of merchandise is one dollar and fifty cents for five miles, should it be three hundred dollars for one thousand miles?

FOR COLLATERAL READING AND REFERENCE

Hadley's Railroad Transportation.

American Railways.

CHAPTER VII

FACTORS IN THE LOCATION OF CITIES AND TOWNS

THE population of the world is very unevenly distributed. Not far from nine-tenths live in lowland plains, below an altitude of 1,200 feet, in regions where food-stuffs grow. The remainder live mainly in the grass-producing regions of the great plateaus, the mining regions, or the flood-plains and grassy slopes of the higher montane regions.

Distribu-
tion of
population
by altitude

Communal Life.—In each of these regions, also, there is a very unequal massing of population. In part, the various families live isolated from one another; in part, they gather into cities and villages. In other words, the population of a habitable region may be classed as *rural* and *urban*. In the United States and western Europe, agricultural pursuits encourage rural life, each family living on its own estate. In Russia, the agricultural population usually cluster in villages.

Rural and
urban
population

The farmer or freeholder who owns or controls his estate, exemplifies the most advanced condition of personal and political liberty. Only a few centuries have elapsed since not only the land but also the life of a subject was the property of the king or the feudal lord, and in those days about the only people living in isolation were outlaws. In most cases the communal system, best exemplified in Russia, marks an intermediate stage between a low and a high state of civilization; in other instances it is necessary in order to insure safety. German farmers in Siberia usually adopt the village plan for this reason.

Communal
system of
living

For the greater part, the non-agricultural population of

Com-
mercial
system
of living

the civilized world is massed in villages and cities for reasons that have nothing to do with either civilization or self-defence. The causes of the concentration of population in cities and towns are many and their operation is complex. In general, however, it is to facilitate one or more of several things, namely—the receiving, distribution, and transportation of commodities, the manufacture of products, the existence of good harbors, and the existence of minerals and metals necessary in the various industries.

The
country
store a
clearing-
house

The Beginnings of Towns and Cities.—The “country town” of agricultural regions in many ways is the best type of the centre of population engaged in receiving and disbursing commodities. The farmers living in their vicinity send their crops to it for transportation or final disposition. The country store is a sort of clearing-house, exchanging household and other commodities, such as sugar, tea, coffee, spices, drugs, silks, woollens, cotton goods, farming machinery, and furniture for farm products. A railway station, grain elevator, and one or more banks form the rest of its business equipment.

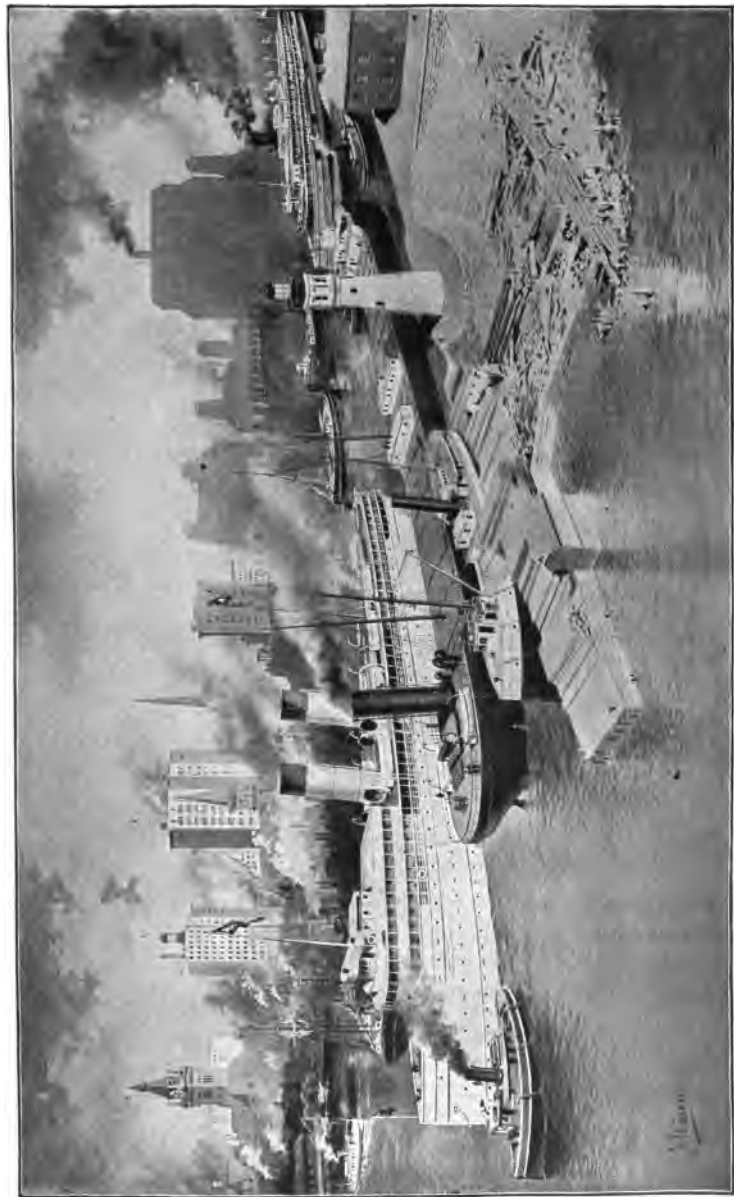
Other sites
advanta-
geous for
a village

Usually the town has resulted from a position of easy access. It may be the crossing of two highways, a good landing-place on a river, the existence of a fording-place, a bridge, a ferry, a toll gate, or a point that formed a convenient resting-place for a day's journey. The towns and villages along the “buffalo” roads are examples almost without number.

Railway
sidings as
village
sites

The “siding” or track where freight cars may be held for unloading, has formed the beginning of many a town. The siding was located at the convenience of the railway company; the village resulting could have grown equally well almost anywhere else along the line.

In the early history of nearly every country, military posts formed the beginnings of many centres that have



THE EFFECT OF POSITION—

BUFFALO IS AT THE FOOT OF LAKE ERIE AND THE HEAD OF ERIE CANAL ; AN EXCELLENT HARBOR FACILITATES ITS COMMERCE

Military
posts as
beginnings
of cities

grown to be large cities. Thus, Rome, Paris, London, the various "chesters"* of England, Milan, Turin, Paris, Chicago, Pittsburg, and Albany were established first as military outposts. The trading post was most conveniently established under the protection of the military camp, and the subsequent growth depended partly on an accessible position, and partly on the intelligence of the men who controlled the trade of the surrounding regions.

Harbors
the reason
for many
cities

Harbors as Factors in the Growth of Cities.—A good harbor draws trade from a great distance. Thus, with a low rate on grain and produce from Chicago, New York City draws a trade from a region having a radius of more than one thousand miles. In its trade with Chinese ports, Seattle, the chief port of Puget Sound, reaches as far eastward as London and Hamburg.

Water-
power
the reason
for growth
of certain
cities

Water-Power as a Factor.—The presence of water-power has brought about the establishment of many centres that have grown into populous cities. The water-power of the New England plateau had much to do with the rapid growth of the New England States. At the time of the various embargo and non-intercourse acts preceding the war of 1812, a great amount of capital was thrown into idleness. The water-power was made available because, during this time, the people were compelled to manufacture for themselves the commodities that before had been imported.

The Fall
Line a
reason for
certain
cities

The manufacturing industry at first was prosecuted in the southern Appalachians as well as in the New England plateau. It survived in the latter, partly because of the capital available, and partly owing to the business experience of the people. In the meantime, villages sprang up in nearly every locality where was available water-power. The cities of the "Fall Line" exemplify this.

* From the Latin "castra," a camp.

Since the use of coal and the advent of cheap railway transportation, steam has largely supplanted water-power, unless the latter is unlimited in supply. As a result, there is a marked growth of the smaller centres of population along the various water-fronts. In such cases the advantages of a water-front offset the loss of water-power.

Availability
of cheap
coal a
factor

The Commerce of Coal and Steel as a Factor.—

A location favorable to the manufacture of iron and steel has determined the sites of many cities. Thus, coal is essential to the manufacture of iron and steel; and, inasmuch as two tons or more of coal are required to manufacture a ton of steel, it is cheaper to ship the ore to a place to which coal can be cheaply brought.

Availability
of coal
and iron
ore

The coal-fields are responsible for the greater part of Pittsburg's population, and almost wholly for that of Scranton, Wilkesbarre, and many other Pennsylvania towns. Iron and coal are responsible, also, for many cities and towns in the vicinity of the Great Lakes to which ore is shipped. Birmingham, Salford, and Cardiff in Great Britain, Dortmund and Essen in Germany, and St. Etienne in France have resulted from the commerce of coal and iron.

Examples

Man as a Factor.—In many instances man is a great factor in the establishment of a city. Chicago would have been quite as well off in two or three other locations; its location is the result of man's energy. St. Louis might have been built at a dozen different places and would have fared just as well; the same is true of St. Paul, Los Angeles, Portland (Oregon), or Indianapolis.

Examples
of man
power in
location
of cities

Leavenworth at one time was a more promising city than Kansas City, but the building of a railway bridge over the Missouri River at the latter place gave it a start, and wide-awake men kept it in the lead. It has grown at the expense of Leavenworth and St. Joseph. Cairo, at the junction of the Mississippi and Ohio Rivers, has the geo-

graphical position for a great city; it waits for the man who can concentrate commerce there. Gary, Indiana, is a fine example of the power of man in the location and building of a great city.

Adjustment to Environment.—San Francisco is wisely located, but its grain trade can be more economically carried on at Karquinez Strait, while its oriental trade is gradually concentrating at Seattle. Philadelphia lost its commercial supremacy when the completion of the Erie Canal gave return cargoes to foreign vessels discharging at New York City. Oswego, N. Y., had the advantage of both harbor facilities and water-power, but Syracuse, with practically no advantages except those of leadership, has far outstripped it.

Such instances of the readjustment of centres of population have been common in the past; they will also occur in the future. In nearly every case the readjustment results from economic causes, the opening of new lines of transportation, the lowering of the cost of the production of a commodity, the discovery of new economic processes—all these cause a disturbance of population, and the latter must readjust itself to new and changed conditions.

Not all peoples have the necessary intelligence and training at first to adapt themselves to their environment. For the greater part, the American Indians were unable to take advantage of the wonderful resources of the continent in which they lived. The Boers occupied about the richest part of Africa, but made no use of the natural wealth of the country beyond the grazing industry; in fact, their nomadic life reduced them to a plane of civilization materially lower than that of their ancestors.

People of the highest state of civilization do not always adjust themselves to their environment readily. The people of the New England plateau were nearly a century in learning that they possessed nearly all the best harbors of

Examples
of
readjust-
ment

Economic
causes of
readjust-
ment

Peoples
who could
not adjust
themselves

Readjust-
ment in
New
England
plateau

the Atlantic coast of North America. When, however, the great commerce of the country had been wiped out of existence, it did not take them long to readjust themselves to the industry of manufacture, the water-power being the natural resource that made the industry profitable.

The completion of the Erie Barge Canal is not likely to draw the commerce of grain from other routes, but the low rates of transportation are likely to encourage the manufacture of steel along the route. Philadelphia and Boston lost much of their foreign commerce to New York City, but gained by a judicious readjustment very extensive manufactures. When the gold mines of California ceased to pay, the people of the foot-hills turned their attention to fruit-growing, a far more renumeration occupation.

Readjust-
ment
caused by
commerce
of Erie
Canal

QUESTIONS FOR DISCUSSION

Were the middle Atlantic coast of the United States to undergo an elevation of 100 feet, what would be the effect on New York City?

Find the factors that led to the settlement of the city or town in which or near which you live. What caused the settlement of the three or four largest towns in the same county?—of the following places: Minneapolis, Fall River, New Haven, New Bedford, Cairo (Ill.), Cairo (Egypt), Marseille, Aix-la-Chapelle, Alexandria (Egypt), Washington (D. C.), Columbus (O.), Johannesburg (Africa), Kimberley (Africa), Albany (N. Y.), Punta Arenas (S. A.), Scranton (Pa.), Vancouver (B. C.), San Francisco, Cape Nome?

What circumstances connected with commerce led to the passing of the following-named places: Palmyra, Carthage, Babylon, Genoa, Venice, Ancient Rome, Jerusalem?

COLLATERAL REFERENCE

Any good cyclopædia.

CHAPTER VIII

THE CEREALS AND GRASSES

Universal
use of
cereal
products

OF all the plants connected with the economies of mankind the grasses hold easily the first place. Not only are the seeds of certain species the chief food of nearly all peoples, but the plants themselves are the food of most animals whose flesh is used as meat. Wheat, maize, and rice are used by all except a very few peoples ; and about



MODERN FARMING—A STEAM PLOW

all the animals used for food, fish and mollusks excepted, are grain eaters, or grass eaters, or both.

Conversion
of grass
products
to meat

The grasses of the Plains in Texas, the Veldt in South Africa, and the hills of New Zealand by nature's processes are converted into meat that feeds the great cities of western Europe and the eastern United States. The corn of the Mississippi valley becomes the pork which, yielded from the carcasses of more than forty million swine, is exported to half the countries of the world. Even the two and one-half billion pounds of wool consumed yearly is converted grass.

Wheat.—The wheat of commerce is the seed of several species of cereal grass, one of which, *Triticum sativum*, is

the ordinary cultivated plant. Wild species are found in the highlands of Kurdistan, in Greece, and in Mesopotamia, that are identical with species cultivated to-day. It is thought that the cultivation of the grain began in Mesopotamia, but it is also certain that it was grown by the Swiss lake-dwellers far back in prehistoric times. It is the "corn" Joseph's brothers sought to buy when they went to Egypt, and the records of its harvesting are scattered all over the pages of written history.

Antiquity
of the use
of wheat

Of the one and one-half billion people that constitute



MODERN FARMING—A GRAIN HEADER

the world's population, more than one-third, or about eight times the population of the United States, are consumers of wheat-bread; and this number is yearly increasing by twelve million. Moreover, each individual of this aggregate consumes yearly very nearly one barrel of flour, or about four and one-half bushels of wheat. In other words, it requires somewhat more than two billion three hundred million bushels of wheat each year to supply the world's demand.* As a matter of fact, the world's crop is

World's
consumption
of wheat

* In 1897 the world's crop fell below the danger line, aggregating only 2,227,000,000 bushels. Since that time, however, it has increased each year; from 1902 to 1908 it has not been less than 3,000,000,000 bushels. In 1909 it was 3,624,418,000 bushels.

Visible
supply

yearly consumed so nearly to the danger-line that very often the "visible supply," or the amount known to be in the market, is reduced to a few million bushels.

Distribu-
tion of
wheat-
growing

Wheat will grow under very wide ranges of climate, but it thrives best between the parallels of 25° and 55° . In a soil very rich in vegetable mould it is apt to "run to



MODERN FARMING—A STEAM HARVESTER AND THRESHER

stalk." A rather poor clay-loam produces the best seed,* and a hard seed, rather than a heavy stalk, is required.

In the latitude of Kansas the seeds planted in the fall will retain their vitality through the winter; in the latitude of Dakota they are "winter-killed," as a rule. Because of this feature two broad classes or divisions of the crop are recognized in commerce—the winter and the spring varieties. In general, the spring wheats are regarded as the

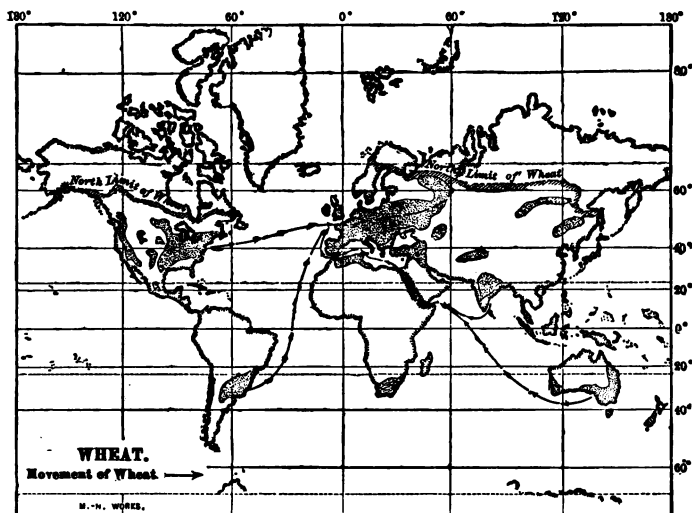
Winter
and spring
varieties

* In order to yield a crop of twenty-five bushels per acre the soil must supply 110 lbs. of nitrogen, 45 lbs. of phosphoric acid, 30.5 lbs. of lime, 14.5 lbs. of magnesia, and 142 lbs. of potash; these are approximately the mineral elements taken out of the soil with each crop, and it is needless to say that they must be replaced or the grain will starve for want of nutrient substances.

better, and this is nearly always the case in localities too cold for winter wheat. There are exceptions to this rule, however. In the main, winter wheat ripens first, and is therefore first in the market.*

In Europe the plain that faces the North and Baltic Seas, and that part which extends through southern Russia,

Wheat
fields of
Europe



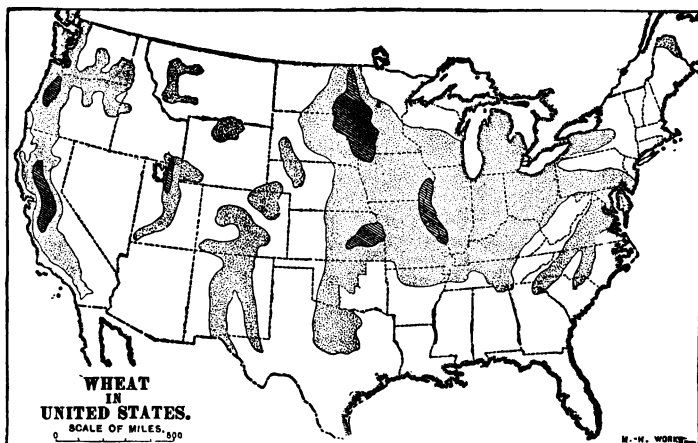
* In the United States there are about seven wheat-districts, each characterized by particular varieties that grow best in the given locality. In the New England and most of the middle Atlantic division Early Genesee Giant, Jones Winter Fife, and Fultz are chiefly grown. In the Southern States Fultz, Fulcaster, Purple Straw, and May are foremost. In the north central group of States Early Red Clawson, Poole, Dawson's Golden Chaff, Budapest, and Fultz are common. In the Dakotas and Minnesota Scotch Fife and Velvet Blue Stem (both spring wheats) are generally planted. In Kansas and Texas and the adjacent locality the principal varieties are Turkey, Fulcaster, and Mediterranean (all winter wheats). In California and the southern plateau region Sonora, California Club, and Defiance are the principal kinds (all winter wheats). In Washington and Oregon Little Club, Red Chaff, and Blue Stem (which are either winter or spring) are the main varieties.

Distribution
of
varieties

yield the chief part of the crop, although the plains of the Po, the Danube, and Bohemia furnish heavy crops. Russia, France, Austria-Hungary, Germany, and Italy are all wheat states. (See Appendix; p. 400).

Production
of Europe

In a normal year all Europe produces not far from one-half of the world's crop. Russia, France, and the Danube countries excepted, scarcely another state produces as much as is consumed. Great Britain consumes her entire



Con-
sumption
of all
Europe

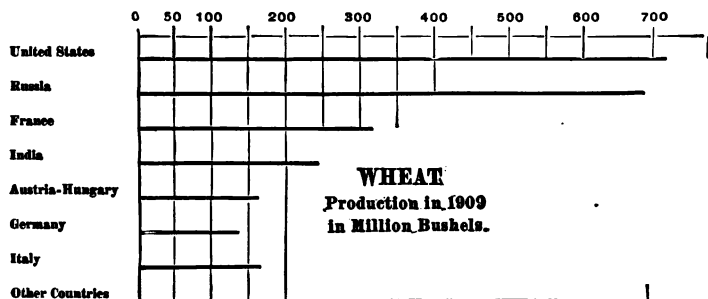
crop in three months; Germany in about six months. France sends a part of her crop to Great Britain and buys of Russia to fill the deficiency. Russia consumes but very little of her wheat-crop; it is nearly all sold to the states of western Europe. All Europe consumes about one-half the world's crop, but produces about one-third; the remainder is supplied by the United States, India, Argentina, Africa, and Australia. The relative consumption is increasing.

Production
of United
States

In the United States the great bulk of the crop comes from the Upper Mississippi valley and Pacific coast States

About one-third is consumed where it is grown ; more than one-half is required for the populous centres of the east ; but very little is now exported and nearly all of this goes to Europe.

Much of this, especially the Pacific coast product, is sold unground, but each year an increasing amount is made into



flour. The flour capacity of the flour mills of the United States aggregates somewhat more than 180,000,000 barrels yearly—the output of about 10,000 flour-mills ; the Pillsbury mills of Minneapolis alone have a capacity of 60,000 barrels a week. In Europe the Hungarian mills and their output of Bohemian flour are the chief competitors of the United States.

The wheat-crop of the Pacific coast has usually been a factor by itself. On account of the absence of summer rains, the kernel is both plump and hard. After the threshing process it is sacked and stored in the fields in which it has grown.* Heretofore much of the sacked wheat has

Manu-
facture of
flour

Crop of
the Pacific
Coast

U. S.	Rest of the World.
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WHEAT

* Sometimes the owner sends it to the nearest elevator at tide-water where the grain is stored, not in bulk, but in the original packages, subject to his demand. In the course of a month or six weeks it absorbs so much moisture that the gain in weight more than pays the storage charges.

Markets
of Pacific
Coast crop

been shipped to European markets by the Cape Horn route, but in late years a considerable amount is made into flour and sold in the larger cities of China and Japan.

Method of
handling
the Central
States crop

East of the Rocky Mountains, after the grain is harvested much of it is sold to dealers whose storage elevators * are scattered all over the wheat-growing region, and at all great points of shipment, such as Duluth, Minneapolis, Buffalo, and the eastern seaports. Before the grain is transferred to the elevators it is inspected and graded, and the cars which contain it are sealed. This wheat constitutes the "visible supply." All the business concerning it is transacted by means of "warehouse receipts," that have almost the currency of ready money. Banks loan money on them almost to their market value.

Warehouse
receipts

Cost per
bushel of
production

Under normal conditions, the cost of growing and harvesting a bushel of wheat—including interest on the land and deterioration of the machinery, etc.—is between fifty and fifty-five cents. The market price, when not affected by "corners" and other gambling transactions, usually varies between ninety cents and one dollar and a quarter. The difference between these figures is divided between the farmer and the "middle-men," the share of the latter being in the form of commissions and elevator charges.

Profits of
middlemen

In addition to bread-making wheat, certain varieties of

Grain
elevators

* The elevators are equipped with "legs" or long spouts, within which belts with metal scoops transfer the grain from car to vessel or *vice versa*. The elevators at Buffalo will fill a canal-boat in an hour's time, or load six grain-cars in five minutes. A large whaleback steamship may be relieved of its 200,000 bushels in about three hours. Most of the east-bound wheat of the Middle West is transferred to the seaboard by rail, but that of the northwest, which forms the chief part of the crop, is shipped from Duluth through the St. Marys Falls Canal to Buffalo, where it is transferred to cars or to canal-boats. New York is the leading export market, but Boston, New Orleans, Galveston, Baltimore, and Philadelphia are also important shipping ports.



STORING PACIFIC COAST WHEAT

Macaroni
wheat; its
uses and
markets

grain known as macaroni wheat have a certain importance in the market. Several varieties are so hardy that they easily resist extremely cold winters; they will also grow in regions too dry for ordinary varieties. In this respect they are well adapted to the plains at the eastern base of the Rocky Mountains. The only detriment is the lack of a steady market. Macaroni wheat has a very hard kernel and is rich in gluten. It is used mainly in the manufacture of macaroni paste, but in Europe, when mixed with three times its weight of ordinary soft wheat, it is much used in making flour. The small amount now grown in the United States is shipped mainly to France.

Yield per
acre of
wheat

The yield of wheat varies partly with the rainfall, but the difference is due mainly to skill in cultivation. In western Europe it is from two to three times as great as in the United States; in Russia and India it is much less.*

Yearly consump-
tion in
United
States

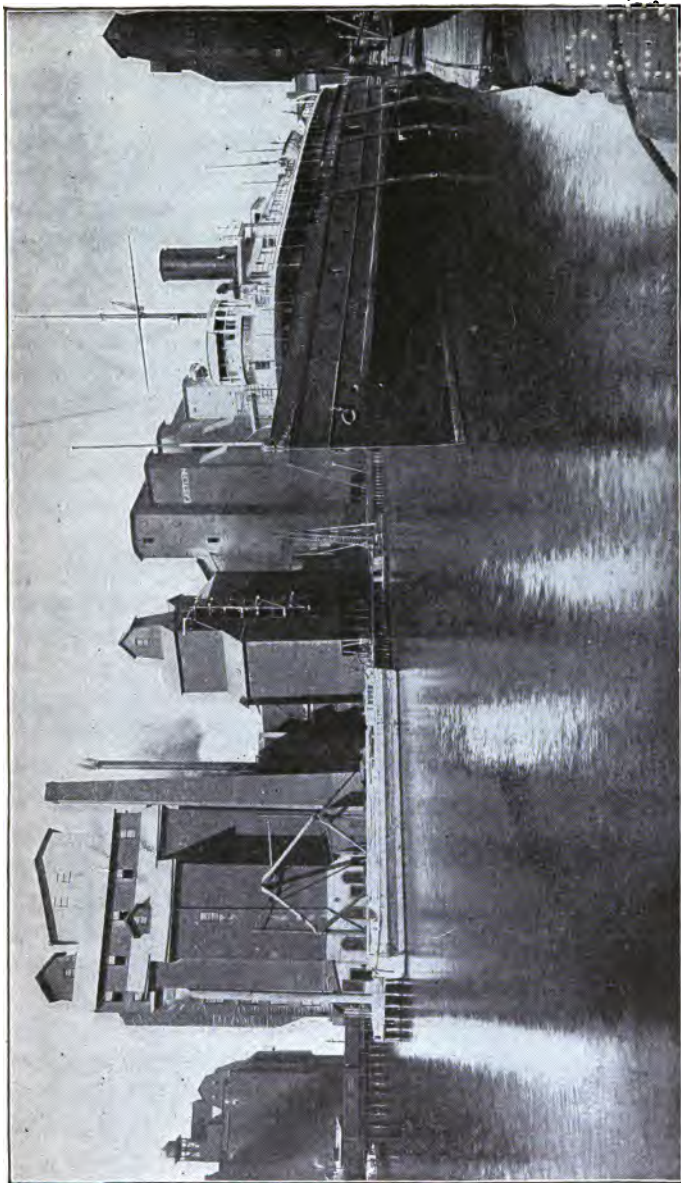
The yearly consumption of wheat is increasing very rapidly both in the United States and in Europe; moreover, China is becoming a wheat-consuming country. In the United States the consumption is increasing so rapidly that unless either the acreage of the crop, or else the yield per acre, is materially increased, there will be little or no surplus for export after the year 1920.

* The following is approximately the yield of the chief wheat-growing countries in bushels per acre.

Yield per
acre in
various
countries

Denmark.....	42	France.....	19.5	Australia.....	10
England.....	29	Austria.....	16.3	India.....	9.2
New Zealand.....	26	Canada.....	15.5	Russia.....	8.6
Germany.....	23.2	United States.....	12.3	Algeria.....	7.5
Holland&Belgium	21.5	Argentina.....	12.2		
Hungary.....	18.5	Italy.....	12.1		

The low average in Australia, India, and Algeria is due mainly to lack of rainfall; in the United States and Russia, mainly to unskilful cultivation.



THE WHEAT INDUSTRY—
GRAIN ELEVATORS AT BUFFALO, NEW YORK

How the
crop of
United
States
may be
increased

In the United States the acreage may be somewhat increased by the irrigation of arid lands now uncultivated, and by the reclamation of overflowed and swamp lands. There are far greater possibilities, however, in the employment of methods of cultivation which will double the rate of present yield. It is doubtful if there can be much increase of acreage in the States of the Mississippi Valley, where the acreage will of necessity be lessened rather than increased.

Increase
of crop in
Europe,
Plate
River
states, and
Brazil

In western Europe there can be no material increase of the acreage or the rate of yield; in Russia both are possible. The plains of Argentina now yield a notable quantity—about one hundred million bushels—and the amount may be increased. Moreover, a large product may be obtained from both Uruguay and Paraguay, and southern Brazil, neither one of which produces a considerable quantity. At the present rate of the increase in consumption, all of the available land, yielding its maximum, will not produce a sufficient crop at the end of the twentieth century.

Origin of
maize
plant

Corn.—Maize or Indian corn is the seed of a plant, *Zea mays*, a member of the grass family. It is not known to exist in a wild state. The species now cultivated are undoubtedly derived from the American continent, but evidence is not wanting to show that it was known in China and the islands of Asia before the discovery of America.* The commercial history of corn begins with the discovery of America. Next to meat it was the chief food of the native American; next to wheat it is the chief food-stuff in the American continent to-day.

Conditions
for culti-
vation

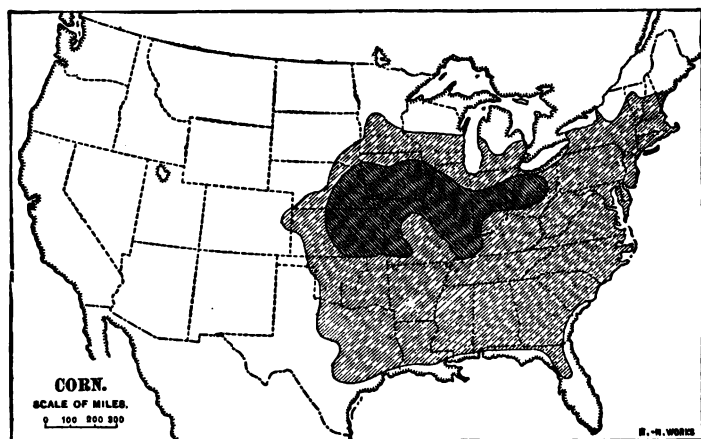
Corn requires a rich soil and is not so hardy as wheat. It thrives best in regions having long summers and warm

* It seems to have been introduced into Turkey from India about the latter part of the fifteenth century, after which it was occasionally heard of in Europe as "Turkey corn."

nights. The growing crop is easily injured by too much rain. It is an abundant crop in the central Mississippi Valley, but not near the coast; it is very prolific in Nebraska, but not in Dakota; it thrives in Italy, Austria, and the Balkan Peninsula, but not in the British Isles and Germany. It is a very important crop in Australia, and is the staple grain of Mexico. It is the crop of fourteen-hour days and warm nights.

Localities
of prolific
growth

The United States is the chief producer of corn, and



from an area of 80,000,000 acres—about that of Ohio, Indiana, and Illinois combined—more than two billion bushels, or four-fifths of the world's crop, are produced. In the past few years the area planted with corn has not materially increased, and it is likely to be lessened rather than increased in the future. From the same acreage, however, the annual yield, now about twenty-five or thirty bushels per acre, can be more than doubled by the use of more skilful methods of cultivation.

Corn crop
of United
States

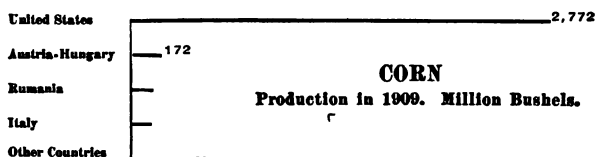
Corn contains more fatty substance, or natural oil, than

Value as a
food-stuff

wheat, and therefore has a greater heating power. For this reason it is better than wheat for out-of-door workers, and it is almost the only cereal food-stuff consumed in Spanish America. It is also a staple food-stuff in Egypt. Corn has been used as a bread-stuff in the United States, Italy, and Rumania* for a long time. In recent years, however, its use has become very popular in Europe.

Economy
of
conversion
to pork

In the United States by far the greater part of the crop is consumed where it is grown, being used to fatten swine



and cattle. The market value of a pound of corn is about one-third of a cent; converted into pork or beef, however, it is worth five or six times as much. By feeding the corn to stock, therefore, a farmer may turn an unmarketable product into one for which there is a steady demand.

Although corn is not so essential a staple as wheat, it has a much wider range of usefulness. The starch made from it is considered a delicacy and is used very largely in America and Europe as an article of food. Glucose, a cheap but

By-prod-
ucts of corn



CORN

wholesome substitute for sugar, is made from it; from the oil a substitute for rubber is prepared; smokeless powder and other explosives are made from the pith of

* The "tortilla," the national bread of the Mexican, consists of a thick corn-meal paste pressed into thin wafers between the hands, and baked on hot slabs of stone. The corn-meal "mush" of the American, the "polenta" of the Italian, and the "mamaliga" of the Rumanian are all practically corn-meal boiled to a thick paste in water.

the stalk; while a very large part of the product is used in the manufacture of liquor.

Rye.—Rye is the seed of a cereal grass, *Secale cereale*, a plant closely resembling wheat in external appearance. Rye will grow in soils that are too poor for wheat; its northern limit is in latitudes somewhat greater than that of wheat, also. It is an ideal crop for the sandy plain stretching from the Netherlands into central Russia, and this locality produces almost the whole yield. The world's crop is about one and a half billion bushels, of which Russia produces nearly two-thirds. Germany, Austria-Hungary, and Japan grow nearly all the rest. It is consumed where it is grown. In the United States the yearly product is about thirty-one million bushels, about one-tenth of which is exported to Europe. Rye-bread is almost always sour, and this fact is its chief disadvantage.

Regions of
cultivation

Consumption
and
market

Barley.—Barley is the seed of several species of cereal grass, mainly *Hordeum distichum* and *Hordeum vulgare*. It is one of the oldest-used of bread-stuffs. It can be cultivated farther north than wheat, and about as far within the tropics as corn; it has, therefore, very wide limits. Formerly it was much used in northwestern Europe as a bread-stuff, but in recent years it has been in part supplanted by wheat and corn. Barley is a most excellent food for horses, and in California is grown mainly for this purpose. Its chief use is for the manufacture of the malt used in brewing.

Regions of
cultivation

Uses

The world's crop of barley is not far from one and one-half billion bushels, of which the United States produces about 170,000,000 bushels. Most of the crop is grown in the Germanic states of Europe, and in Russia.

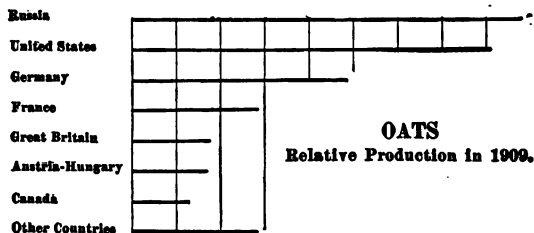
World's
Consumption

Oats.—The oat is the seed of a cereal grass, *Avena sativa* being the species almost always cultivated. It is not known where the cultivated species originated, but the

Origin

Occurrence

earliest known locality is central Europe, where it was certainly a domestic plant during the Bronze Age. It seems probable that the species now cultivated in Scotland at one time grew wild in western Europe; certain it is that wild species are found in North America.



World's production

The oat grows within rather wider limits of latitude, and thrives in a greater variety of soils than does wheat. Grown in a moist climate, however, the grain is at its best. The oat-crop of the world aggregates more than three billion bushels, of which the United States produces one-third. A small portion of this is used as a bread-stuff, but the greater part is used as horse-food, for which it is remarkably adapted.

Markets and consumption

U. S.	Rest of the World.
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OATS

In Europe, Russia is the greatest producer, and its yearly oat harvest is about one-quarter of the world's crop. The states of northwestern Europe yield about half the entire crop; the wheat-growing area of the United States produces the remaining one-third. Russia and the United States are both exporters, the grain going to western Europe. By far the greater part of the grain is consumed where it is grown.

Origin

Rice.—Rice is the seed of a cereal grass, *Oryza sativa*. It is claimed to be native to India, but it is known to have

been cultivated in China for more than five thousand years. It grows wild in Australia and Malaysia.

Rice requires plenty of warmth and moisture. It is cultivated in the warmer parts of the temperate zone, but it thrives best in the tropical regions. In China a considerable upland rice is grown, but for the greater part it is grown in level lowlands that may be flooded with water. The preparation of the fields is a matter of great expense, for they may require flooding and draining at a moment's notice. The crop matures in from three to six months. After threshing, the seed is still covered with a husk, and in this form it is known as "paddy." The supply of rice is unequal to the demand; probably twice as much would be consumed were it produced. Pound for pound, it contains more nutriment than white wheat-flour. The commercial article known as "polished" rice is but little better than a fraud. The polishing process deprives the grain of much of its nutriment, and adds thereto a coating of paraffine and talc.

Occurrence

Preparation of fields

Inadequate supply

"Polished" rice

QUESTIONS FOR DISCUSSION

Why is not wheat-growing a profitable industry in the New England States?—in the plains at the eastern base of the Rocky Mountains?—in the southern part of the United States?

What are meant by the following terms: No. 1 spring, a corner, a disk harrow, a cradle, a flail, a separator, futures, warehouse certificates?

In 1855 the price of a barrel of flour in New York or Boston was about twelve dollars; at the close of the century it was less than five. Explain how the lessened price came about.

From a census or other report make a list of the ten leading wheat-producing States; the ten that produce the most corn.

Why are the foreign shipments of oats less than those of wheat?

What are the prices current of wheat, corn, oats, and barley to-day?

CHAPTER IX

TEXTILE FIBRES

Textile
substances

UNDER the term "textile" are included the fibrous substances that can be spun into threads, and woven or felted into cloth. Some of these, like the covering of the sheep,



COTTON PRESS YARD, NEW ORLEANS, LA.

History
of cloth

goat, and llama, or the cocoon of the silk-worm, are of animal origin; others, like cotton furze, the husk of the coconut, and the bast of the flax-plant, are vegetable products. Their use in the manufacture of cloth antedates the period at which written history begins; it probably begins with

the time when primitive man gradually ceased to have the hairy covering necessary to protect him from the conditions of climate and weather.

As body coverings, all these substances are dependent on a single principle, namely—they are poor conductors of heat; that is, they do not permit the natural heat of the body to pass away quickly, nor do they allow sudden

Conduc-
tivity



PICKING COTTON, ALABAMA

changes of the temperature to reach the body quickly. In other words, because of the artificial covering which mankind alone requires, body heat is not dissipated

more rapidly than it is created; if it were, the covering would be worthless. A suit of clothes made of steel wire, for instance, because it conducts heat so rapidly, would chill, or perhaps heat the body more quickly than the open air.

Relative
conduct-
tivity of
textiles

With respect to warming qualities, wool surpasses all other textiles. It is employed for clothing in every part of the world and and by nearly all peoples. Cotton is used mainly also for body coverings, but it is inferior to wool for protection against cold. It is used by practically all peoples,



TRANSPORTING COTTON FROM WHARF,
CHARLESTON, S. C.

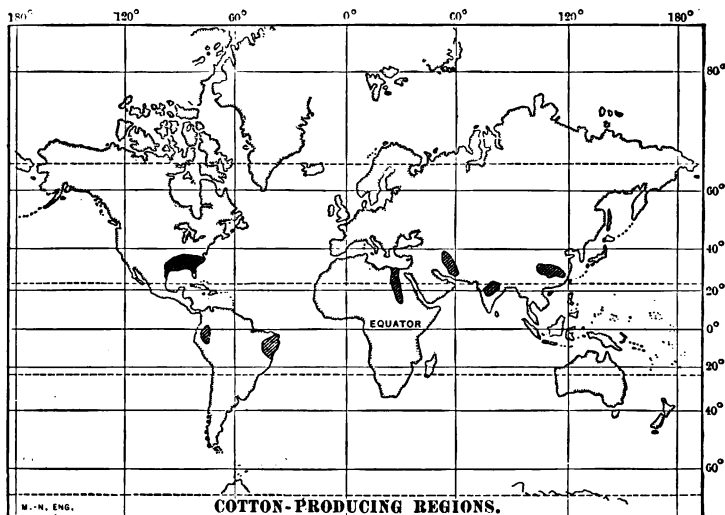
Compari-
son of
cotton
and wool

Uses of
linen, silk,
and hemp

savage and civilized, outside of the frigid zones. Linen is inferior both to cotton and wool for clothing; its use is also restricted by its great cost. Silk is used mainly for ornamental cloths. Hemp is used chiefly for cordage, and the use of ramie, jute, and sisal hemp is confined to the manufacture of very coarse cloths and rugs.

Origin of
cotton

Cotton.—The cotton fibre of commerce is the lint surrounding the seeds of several species of *Gossypium*, plants



Dispersion
for com-
mercial
purposes

belonging to the same natural order as the marshmallow and the hollyhock. The cultivated species have been carried from India to different parts of the world. A native plant, known as Barbados cotton, occurs in the West Indies, and it was probably carried from this island to the United States; a herbaceous cotton-plant is known to have been cultivated in Peru long before the discovery of Columbus.

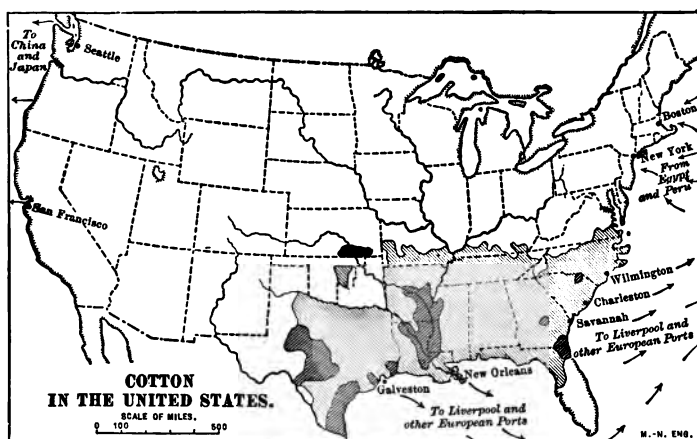
History

More than four hundred years before the Christian era Herodotus describes it and mentions a gin for separating

the lint from the seed. Nearchus, an admiral serving under Alexander the Great, brought to Europe specimens of cotton cloth, and in the course of time it became an article of commerce among Greek and Roman merchants.

The cotton-plant requires warmth, moisture, and a long season. It also thrives best near the sea. It grows better, on the whole, in subtropical rather than in tropical regions, and the difference is due probably to the longer days and

Conditions
for growth



higher temperature of the subtropical latitudes. In the United States the northern limit is approximately the thirty-eighth parallel. The seeds are planted, as a rule, during the first three weeks of April and the first two of May. The plants bloom about the middle of June; the boll or pod matures during July, and bursts about the first of August. The picking begins in August.

Time of
planting
and
harvesting

The yield and the quality of the textile depend not only on conditions of the soil, but on locality. In the river flood-plains of the southern United States the yield is about two bales per acre; on the bluff lands it is but little

Yield

Varieties

more than one, unless unusual care is taken in the preparation of the land. The islands off the Carolina coast produce a very fine long-staple variety, commercially known as *sea island cotton*. A district in China produces a good fibre of brownish color known as *nankeen*, named for the city of Nanking, whence formerly it was exported. The valley of Piura River, Peru, produces varieties of long-staple cotton that in quality closely resemble silk.

Length of staple

The fibre of ordinary American cotton is about seven-eighths of an inch long; it is made into the fabrics commercially known as "domestics" and "prints," or calico. If the fibre averages a little longer than the common grades it is reserved for canvas. Ordinary Peruvian cotton has a fibre nearly two inches long; it is used in the manufacture of hosiery and balbriggan underwear, and also to adulterate wool. The long-staple cotton of the Piura Valley is bought by British manufacturers at a high price, and used in the webbing of rubber tires and hose. Egyptian cotton is very fine and is used in the manufacture of thread, mercerized cloth, and knit underwear. Sea island fibre is nearly two inches long and is used almost wholly in the making of thread and lace.

Specific uses

Cotton as a political factor

The introduction of cotton cultivation resulted in very far-reaching consequences both from a political as well as an economic stand-point. The invention of the steam-engine by Watt gave England an enormous mechanical power. To utilize this the cotton industry was wrested from Hindustan; the mills were concentrated in Manchester and Lancashire; the cotton-fields were transferred to the United States.

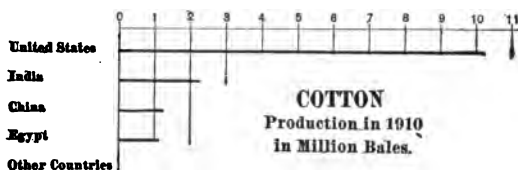
Results of readjustment

As a result, the plains of Hindustan were strewn with the bodies of starved weavers and spinners, but a great industry grew into existence in England. The invention of spinning machinery by Arkwright, Crompton, and

Hargreaves, and the gradual improvement of the powerloom, greatly reduced the cost of making the cloth and, at the same time, enormously increased the demand for it.

In the United States the consequences were far more serious. The invention of the engine or "gin" for separating the lint from the seed made cotton cultivation highly profitable.* The negro slaves, who had been scattered

Results of
invention
of cotton
gin



throughout the colonies and the States that succeeded them, were soon drawn to the cotton-growing States to supply the needed field-labor; and, indeed, white workmen could not stand the hot, moist climate of the cotton-fields.

The cotton-mills grew up in the Northern manufacturing States. The Northern manufacturer needed a tariff on imported goods to protect him from European competition; the Southern cotton-planter who purchased much of his supplies abroad was hurt by the tariff. After about sixty years of strained relations between the two sections there occurred the Civil War which wiped out nearly one million lives, and rolled up a debt, direct and indirect, of nearly six billions of dollars.

Political
effects of
cotton
cultivation
in United
States

The world's cotton-crop aggregates from twelve million

* The gin, invented by Eli Whitney in 1793, enabled one man to do by machinery about the same amount of work as previously had required one hundred laborers. For want of the laws necessary to protect his invention, Whitney was defrauded of the profits arising from it. Neither Congress nor the courts gave him any relief from the numerous infringements, and he died a poor man.

The
cotton gin

World's
cotton crop

to sixteen million bales yearly, of which the United States produces, as a rule, about three-fourths. Egypt is rapidly taking an important place among cotton-producing countries, and, with the completion of the various irrigating canals, will very soon rank next to the United States. India ranks second; China and Korea produce nearly as

UNITED STATES	Rest of the World
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Regions of
production

COTTON

much. There are a few cotton-cloth mills in these states, but in Japan the manufacture has increased greatly, the mills being equipped with the best of modern machinery. Brazil has a small product, and Russia in Asia needs transportation facilities only to increase largely its growing output.

Disposal of
crop in
United
States

The cotton-crop of the United States is quite evenly distributed; one-third is manufactured at home; one-third is purchased by Great Britain; and the remaining third goes mainly to western Europe. In 1913 the exports of American cotton reached the high-water mark of more than six hundred million dollars. New Orleans, Galveston, Savannah, and New York are the chief ports of shipment. The imported Egyptian and Peruvian cotton is landed mainly at New York. Most of the cotton manufacture is carried on in the New England States, but there is a very rapid extension of cotton manufacture in the South.

Ports of
export and
import

Centres of
manu-
facture

Distinction
between
hair and
wool

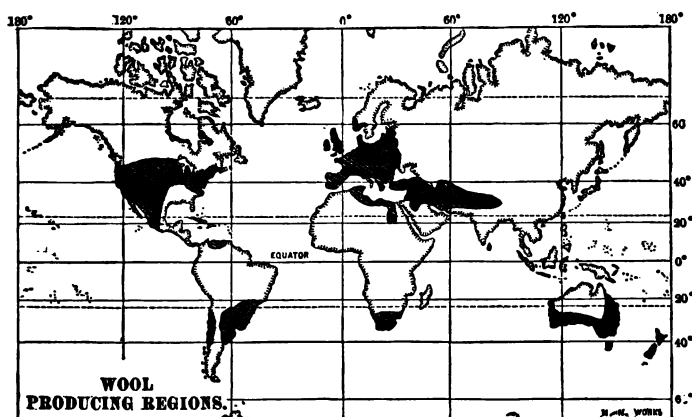
Wool.—The wool of commerce is a term applied to the fleece of the common sheep, to that of certain species of goat, and to that of the camel and its kind. There is no hard-and-fast distinction between hair and wool,* but, in general, wool fibres have rough edges, much resembling overlapping scales which interlock with one another; hair, as a rule, has a hard, smooth surface. If a mass of loose

* The commercial distinction is a sensible one: hair is hard, crisp, straight, and does not felt; wool is soft, curly, and felts readily.

wool be spread out and beaten, or if it be pressed between rollers, the fibres interlock so closely that there results a thick, strong cloth which has been made without either spinning or weaving.

This property, known as "felting," gives to wool a great part of its value, and is its chief distinction from hair. Some kinds of hair, however, have a slight felting property, and if sufficiently fine may be spun and woven. The hair of the common goat is worthless for this purpose, but that

Felting
properties



of the Cashmere and Angora species have the properties of wool. The hair of the Bactrian camel, and also that of the llama, alpaca, and vicuña is soft and fine, possessing felting qualities that make it very superior as a textile.

The quality of wool varies greatly according to the conditions of soil, climate, and the character of the food of the animal. In commerce, however, the fleeces are commonly graded as "long-staple," "short-staple," "merino," and "coarse."

Com-
mercial
classifica-
tion

In long-staple wools the fibres are from four to eight

Combing
wools

inches long; they are more easily separated by a process much like combing, and are therefore called "combing" wools. The cotswold, cheviot, and most of the wools of the British Isles are of this kind; indeed, in fairly moist lowland regions such as Canada and the United States, there is a tendency toward the development of a long-staple product. The English long-staple wools are largely made into worsted cloth, the Scotch cheviot into tweeds, and the French into the best dress cloth.

Carding
wools

If the fibres are materially less than four inches in length, the product is classed as a short-staple or "carding" wool. By far the greater part of the wool of the United States, Canada, and Europe is of this class. It is disposed of according to its fineness or fitness for special purposes, the greater part being made into cloths for the medium grades of men's clothing.

Merino
wools

The finest and softest wool, as a rule, is grown in arid, plateau regions, and of this kind of staple the merino is an example. The fibres are fine as silk, and the goods made from them are softer. The Mission wool of California is the product of merino sheep and, indeed, the conditions of climate in southern California and Australia are such as to produce the best merino wool. The famous Electoral wool of Saxony is a merino, the sheep having been introduced into that country from Spain about three hundred years ago. The merino wools, as a rule, are used in the most highly finished dress and fancy goods.

Carpet
wools

The coarse-staple wools are very largely used for American carpets, coarse blankets, and certain kinds of heavy outer clothing. The Russian Donskoi wool, some of the Argentine fleeces, such as the Cordoban, and many of those grown in wet lowlands are very coarse and harsh. The quality is due more to climatic conditions and food than to the species of sheep; indeed, sheep that in other



SHEEP FEEDING ON ALFALFA



SHEEP RANGE, UTAH



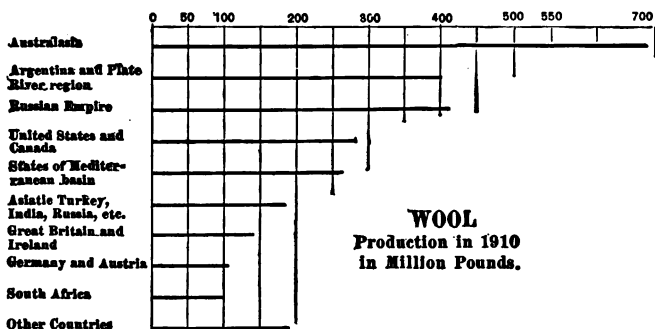
SHEEP IN FEEDING YARD
THE WOOL-GROWING INDUSTRY

regions produce a fine wool, when introduced to this locality, after a few generations produce coarse wool.

The rug wools grown in Persia, Turkestan, Turkey in Asia, and the Caucasus Mountains are also characteristic. They vary in fineness, and because they do not readily felt they are the best in the world for rug stock. The "pile" or surface of the rug remains elastic and stands upright even after a hundred years of wear. This quality is due mainly to conditions of climate and soil.

In some instances the wool is obtained by a daily combing of the half-grown lambs. This process, however, is

Rug
wools



employed in the rug-making districts only; in general, the fleeces are clipped either with shears or machine clippers. In the United States the latter are generally employed, and but little attempt is made either to sort the fleeces or to separate the various qualities of wool in the same fleece.

Methods
of taking
the fleece

The raw wool always contains foreign matter such as burs and dirt; it is also saturated with a natural oil which prevents felting. The oil, commonly called "grease," or "yolk," is an important article of commerce; under the name of "lanolin" it is used in medicine and pharmacy as a basis for ointments.

By-
products

The world's yearly clip is nearly two and three-quarter billion pounds, of which the United States produces about one-eighth. In Europe and the United States, owing to the increasing value of the land, the area of production is decreasing; in Australia, South Africa, and Argentina, where land is cheap, it is increasing. From these three regions wool is exported; most European countries and the United States buy it. In the latter country the consumption is about six pounds for each person.

World's
product

U.S.	Rest of the World
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WOOL

Consump-
tion in
United
States

The wools of the Mediterranean countries—France, Spain, Italy, Algiers, Egypt, etc.—are the best for fine cloths; those of central Asia for rugs and shawls; the others are used mainly in medium and low grade textiles.

States
producing
fine cloth
wools

Other Wools.—The Angora goat, originally grown in Anatolia (Asia Minor), and the Iran States (Persia, Afghanistan, and Baluchistan), furnishes a beautiful white wool, commercially known as "mohair." Smyrna is an important market for it, and England is the chief buyer. The Angora goat has been introduced into South Africa and California, where it is successfully grown. From the former country there is a large export of mohair.

Production
of Angora
wool; its
market

Cashmere wool is a fine, downy undercovering, obtained by combing the fleece of a goat native to the Kashmir Valley in India. A single animal yields scarcely more than an ounce or two, and the best product is worth about its weight in gold. It is used in the manufacture of the famous Cashmere shawls, which are sold at prices varying from five hundred to five thousand dollars. They are made in Persia and India.

Occurrence
and uses of
cashmere
wool

Llama and alpaca wool are fine textile obtained from animals of the camel kind native to South America. The wool is either black or brown in color. A considerable

Occurrence
and uses of
alpaca
wool

part is used for native-made articles, such as saddle-blankets, etc., but much of it is exported to England.

Occurrence
and uses of
camel's
hair

Most of the "camel's hair" of commerce was originally worn by goats, being called by its commercial name because of a similarity in texture to that of the camel's hair. The camel of Turkestan, however, furnishes a silky textile that is much used. The brown wool often found in Hamadan rugs is natural camel's hair, and a considerable amount mixed with sheep's wool is used in certain textiles. The camel's hair of China is made into artists' brushes.

Silk-
growing
industry

Depend-
ence on
mulberry-
tree

Silk.—The silk of commerce is the fibre spun by the larvæ or caterpillars of a moth, *Bombyx mori*, as they enter the chrysalis stage of existence. The silk-growing industry includes the care and feeding of the insect in all its stages. The leaves of the white mulberry-tree (*morus alba*) are the natural food of the insect, and silk-growing cannot be carried on in regions where this tree does not thrive. Not all areas that produce the mulberry-tree, however, will also grow the silk-worm; the latter cannot exist in regions having very cold winters, and therefore the industry is restricted by climate.

Eggs of
the silk-
moth

The moth, shortly after emerging from the chrysalis stage, lays from two or three hundred to seven hundred eggs. These are "hardy"—that is, they will remain fertile for a long time if kept in a cool, dry place; moisture will cause them to putrify, and heat to germinate. If well protected, they may be transported for distances.

Caring for
the silk-
worm

In rearing the silk-worm, as soon as the latter is hatched, it is placed on mulberry-leaves, and for five weeks it does nothing but eat, in that time consuming many times its weight of food.* Then it begins to spin the material that

* An ounce of eggs produces about forty thousand worms, and these, during the grub stage, require about fifteen hundred pounds of leaves, about one-half of which is actually consumed



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SILK INDUSTRY

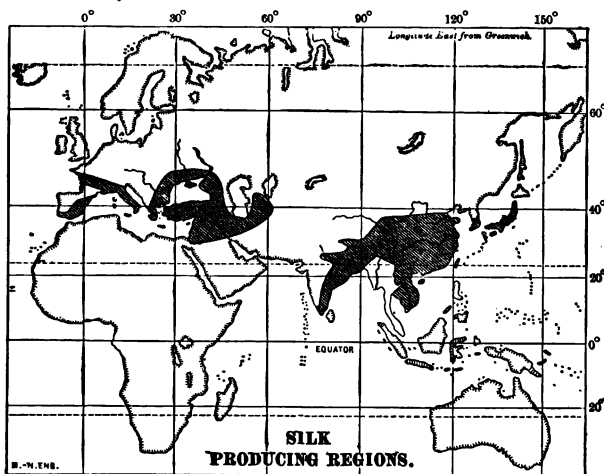
1. Silkworm Eggs.
2. Fourth-stage Worm.
3. Pupa in Cocoon.
4. Cocoon.

5. Male Moth.
6. Female Moth.
7. Unspun Silk.
8. Raw Manufactured Silk.
9. Manufactured Silk.

Spinning
the fibre

forms its chrysalis case or cocoon. The outer part of the case consists of a tough envelope not unlike coarse tissue-paper; the inner part is a fine thread about one thousand feet long that has been wound around the body of the worm. This thread or filament is the basis of the silk textile industry.

At the proper time the cocoons are gathered and, if immediately to be used, are plunged into hot water. This



Method of
obtaining
the fibre

not only kills the chrysalids but softens the cocoons as well, so that the outer cases may be removed. The cases removed, the rest of the cocoon is soaked in warm water until the gummy matter is softened and the fibres are free enough to be reeled. In the latter process the ends of a number of cocoons, varying from five to twenty, are caught and loosely twisted into a single strand. The silk thus prepared forms the "raw silk" of commerce. Sometimes a number of strands of raw silk are twisted into a coarse thread, thereby forming "thrown silk." For convenience

Raw and
thrown
silk

in handling, both raw and thrown silk are made into large skeins called "hanks," and most of the silk product is exported in this form.

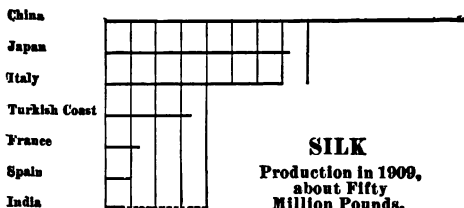
A given quantity of cocoons yields scarcely more than one-tenth its weight in good raw silk. The remaining part, consisting of broken fibres and cases, is shredded and spun into silk thread of inferior quality. This material, commonly called "husks" or "knubs," forms an important item in silk manufacture, and much of it is exported to Europe and America.

Preparation of refuse silk fibre

According to traditions, not wholly trustworthy, eggs of the silk-worm were smuggled to India in the head-dress of a Chinese princess. Thence sericulture slowly made its way westward to Persia, Asia Minor, and the Mediterranean countries. Wild silk, a coarse but strong product, is grown in many of these countries, but mainly in China, where it forms an important export. The Chinese product is commercially known as "tussar" silk. Of the

History

Tussar silk



product of raw silk, China, Japan, and Italy produce about four-fifths. The remainder is grown in the Levant, Spain, and France.

Most of the raw silk of China is exported from Shanghai and Canton; that of Japan is shipped mainly from Yokohama. Among European countries Italy is the first producer of raw silk, and France the chief manufacturer.

Commerce of silk

High tariff
and silk
manu-
facture in
United
States

By the operation of a heavy tariff a considerable manufacture of silk textiles has grown up in the United States. New York City and Paterson, N. J., are the chief centres of the industry.

Reasons
for unsuc-
cessful
cultivation
in United
States

The southern part of the United States offers an ideal locality for sericulture. Various attempts at silk-worm breeding have failed, partly from lack of training, but chiefly because of the high cost of labor.

History
of flax

Flax.—The flax of commerce, the basis of linen cloth, is the bast or inner bark-fibre of an annual plant (*Linum usitatissimum*, i.e., most useful fibre), native probably to the Mediterranean basin. It ranks among the oldest known textiles. Bundles of unwrought fibre have been found in the lake dwellings of Switzerland, and linen cloth constituted a part of the sepulture wrappings of the ancient Egyptian dead.

Occurrence

Flax has a very wide range, thriving in the colder parts of Europe as well as in tropical Asia; it does equally well in the dry summers of California or the moist regions of the Mississippi Valley. The chief requisite is a firm soil that contains plenty of nutrition.

Prepara-
tion

After the stalks have passed maturity they are pulled up by hand; "rippled," or deprived of their seeds and leaves; "retted," or moistened in soft water until the bast separates; "broken" and "scutched" by a machine which gets rid of the woody fibres; and finally the loosened bast fibre is "hetcheled" or combed in order to separate the long, or "line," threads from the "tow" or refuse.

Production

Russia produces more than one-half the world's crop, but the finest and choicest is that known as Courtrai fibre, which is grown in Belgium. This is thought to be due to the quality of the water in the Lys River. A considerable amount of flax grown elsewhere in Europe is sent to this part of Belgium to be retted. Ireland and Ger-

Quality
of fibre

many produce considerable amounts, and a small quantity is grown in the United States.

The prepared flax is used in the manufacture of linen cloth, and the latter is almost exclusively used for table-cloths, napkins, shirt-bosoms, collars, cuffs, and handkerchiefs. France is noted for the manufacture of linen lawns and cambrics, and Belfast, Ireland, for table-cloths and napkins. Nearly the whole linen product is consumed in the United States, Canada, and western Europe; indeed, linen is a mark of western civilization. Great Britain handles the greater part of the linen textiles.

Uses and centres of manufacture

Consumption

Hemp.—The true hemp of commerce is the bast or inner bark of a plant, *Cannabis sativa*, belonging to the nettle order. It is an annual plant having a very wide range; it occurs in pretty nearly every country of North America, Europe, and Asia. In Europe the chief countries producing it for commercial uses are Russia, France, Italy, and Hungary; in the United States it is grown in California and the central Mississippi Valley. Russia produces the largest crop; Italy the finest quality of fibre, the best coming from the vicinity of Bologna.

Occurrence

The stalks grow three feet or more in height. When cultivated for the fibre they are pulled from the ground, stripped of their leaves and soaked until the fibre is free. They are then "retted," or beaten, and the fibre is removed. After preparation the fibre is used mainly for the manufacture of wrapping-twine, cordage, and a coarse canvas. Great Britain is the chief purchaser and manufacturer.

Preparation and uses

Consumption

Manila Hemp.—Manila hemp is the name given to a fibre obtained from the leaves of a plant, *Musa textilis*, belonging to the banana family. The best fibres are from six to nine feet in length, of light amber color, and very strong. The leaves, torn into narrow strips by hand, are afterward scraped by hand until the fibre is free of pulp.

Occurrence

Preparation

Uses

The long and coarser fibres are made into rope; the shorter fibres are beaten and hatched in the same manner as flax, until fine enough to weave into mats, carpets, and fine cloth. The fibres that have served their usefulness as rope are pulped and manufactured into manila paper.

Manufacture and commerce

Practically all the manila fibre of commerce—which is not hemp at all—is grown in the Philippine Islands, and since peace has prevailed, the growth and production is increasing. The crude fibre is prepared by hand, by Filipino or by Chinese labor. The manufacture of cordage and paper is done mainly in the United States and Great Britain. Fine hand-made textiles are made by a few Filipino natives, but most of the goods of this character are manufactured in France. Very fine fibre is sometimes used as an adulterant of silk. Great Britain and the United States are the chief purchasers.

Origin

Sisal Hemp.—Sisal hemp, or henequen, is a stout, stringy fibre obtained from the thick leaves of several species of agave, to which the maguey and century-plant belong. The cultivated species, from which most of the commercial product is obtained, is the *Agave sisalina*, which much resembles the ordinary century-plant.

Preparation

The essential feature in the economic production of sisal hemp is machinery for separating the fibre from the pulp of the leaf. The fibre is whiter, cleaner, and lighter than jute; moreover, in strength it ranks next to the best quality of manila hemp. It is used mainly in the manufacture of grain-sacks, and the twine used on self-binding harvesters.

Uses

Commerce

Nearly all the fibre of commerce is grown in the Mexican state of Yucatan and consumed in the United States. The cultivation of this material has made Yucatan one of the most prosperous states of Mexico.

Origin

Jute.—Jute is a fibre obtained from the inner bark of a tropical plant, *Corchorus olitorius*, belonging to the same

order as the linden-tree. The plant is an annual, growing in various moist, tropical countries, but is extensively cultivated in India and parts of China for commercial purposes. The fibre is prepared for manufacture in much the same manner as hemp and flax. In India it is used mainly for the manufacture of a coarse textile known as gunny cloth, used as bale-wrappers, and sacks for coffee and rice. On the Pacific coast states it is used for wheat-sacks. Calcutta is the chief centre of manufacture, but jute-sacks are extensively manufactured by the Chinese in California and China.

Preparation and uses

Commerce

Ramie.—This fibre, also known as China grass, is the bast of two or more species of nettles, prepared in the same manner as hemp fibre. It is finer and stronger than jute, and will take dye-stuffs in a superior manner. With the introduction of machinery for separating and handling the fibre, the cultivation of the ramie plant has spread from China to India, Japan, and the United States. Fine textiles are now manufactured from it, the most important being carpets, mattings, and American "Smyrna" rugs. The last are generally sold as jute-rugs, and they are nearly as durable as woollen floor-covers.

Qualities

Cultivation

Uses

Other Economic Fibres.—The fibre of *cocoanut husk* is largely employed in the manufacture of coarse matting. A part of this is obtained from tropical America, but it is a regular export of British India, where it is known as *coir*.

Coir

The midrib of the *screw pine* growing in the forests of tropical America furnishes the material of which "Panama" hats are made. The hats are made in various parts of Ecuador, Venezuela, and Colombia, and were formerly marketed in Panama. Hats made of a score of grasses and fibres are also sold as Panamas.

"Panama" straw

A plant (*Phormium tenax*) having leaves somewhat like those of the iris or common flag furnishes the material of

New Zealand flax

which New Zealand flax is prepared. It is used mainly in the manufacture of cordage.

Cultivation
of plaiting
straw

Plaiting straw, used in the manufacture of hats and bonnets, is grown extensively in northern Italy and in Belgium. For this product spring wheat is very thickly sown in a soil rich in lime. The thick sowing produces a long, slender stalk; the lime gives it whiteness and strength. Plaiting straw is also exported from China and Japan. British merchants handle most of the product.

Uses of
Cuba bast

Cuba bast, a fibre readily bleached to whiteness, is exported to the various establishments in which women's hats are made.

Uses of
esparto
grass

Esparto grass, also called *alfa*, grows in Spain and the northern part of Africa. It was formerly much used in the manufacture of the cheaper grades of paper, but it has been largely supplanted by wood-pulp for this purpose. The decline of the esparto grass industry led to no little unrest among some of the native tribes of northern Africa.

QUESTIONS FOR DISCUSSION

What fibres were used in cloth-making in Europe before cotton was employed?

What textiles are of necessity made of cotton?

What is a spinning jenny?—a Jacquard loom?

What are the specific differences between cotswold and merino wool?

Why were most of the cloth-making mills of the United States built at first in the New England States?

How is the silk-making industry encouraged in the United States?

What are the chief linen manufacturing countries?

FOR STUDY AND REFERENCE

Obtain specimens of the cotton seed, boll, raw cotton (sea island, Peruvian, and ordinary), cotton thread, calico, gingham,

domestic, canvas, and some of the fancy textiles such as organdie, lawn, etc.

Obtain specimens of the cocoons of the silk-worm, raw silk, gros-grain cloth, pongee, and tussar silk cloth.

Obtain also specimens of merino cloth, cashmere, cheviot, and other similar goods ; compare them and note the difference.

Examine the fibres of cotton, silk, and wool under a microscope and note the difference.

CHAPTER X

PLANT PRODUCTS OF ECONOMIC USE—BEVERAGES AND MEDICINAL SUBSTANCES

Stimulant
principle
of
beverages

It may be assumed that practically all beverages derived from plants owe their popularity to the stimulant effects they produce. In coffee, tea, cocoa, and maté, the stimulant principle is identical with *cafein*, the active principle



COFFEE DRYING FIELD, BRAZIL

of coffee; in liquors it is a powerful narcotic *alcohol*; non-potable substances, tobacco, opium, etc., owe their popularity also to narcotic poisons.

Origin and
history

Coffee.—The coffee “beans” of commerce are the seeds of a tree (*Coffea arabica*) probably native to Abyssinia, but now cultivated in various parts of the world. It was introduced into Aden from Africa late in the fifteenth century, and from there its use spread to other cities. Rather

singularly its popularity resulted from the strong efforts made to forbid its use.

It was regarded as a stimulant and therefore it was forbidden to followers of Islam.* But its power to prevent drowsiness and sleep during the intolerably long religious

Peculiar
use in
Muham-
madan
countries



BRANCH OF COFFEE TREE,
WEST BRAZIL



COFFEE PLANTATION NEAR JOLO,
PHILIPPINE ISLANDS

exercises was a winning feature, and so its use became general in spite of the fulminations against it.

Coffee culture was confined to Arabia until the close of the seventeenth century; it was then introduced into the

Occurrence

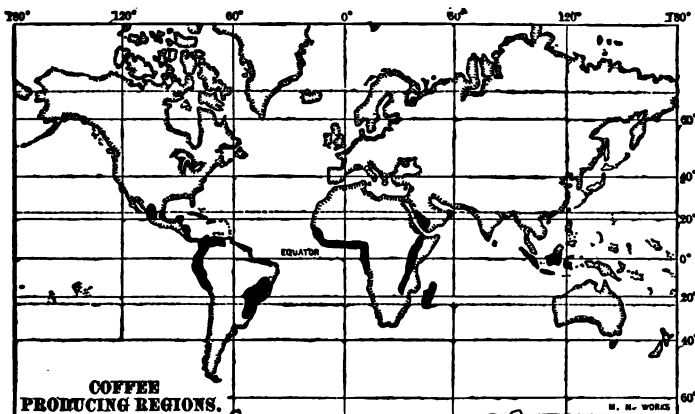
* Charles II. of England also forbade its use (1675) and attempted to close the coffee-houses that had sprung up in London, but in spite of the ban and the prohibitive tax laid upon it, the use of coffee became general. Similar efforts to close the coffee-houses in Constantinople failed.

Production

Dutch East Indies, and for many years the island of Java became the main supply of the world. In the Old World it is now also cultivated along the Guinea coast of Africa, in the Madagascar, India, and Ceylon. In the New World the chief areas are Brazil, Venezuela, the Central American States, the West Indies, and Mexico.

Conditions
of
cultivation

The coffee-tree may be cultivated in almost any soil that is fertile; it thrives best, however, in red soil. Old, decomposed red lavas produce the choicest beans. Coffee



grows in any moist climate in which the temperature does not range higher than 80° F. nor lower than 55° F. An occasional frost injures but does not necessarily kill the trees, which grow in the shade better than in the sunlight. For convenience in gathering the crop, the trees are pruned until they are not higher than bushes.

The coffee
berry

The fruit of the coffee-tree is a deep-red berry not quite so large as a cherry. A juicy pulp encloses a double membrane, or endocarp, and within the latter are the seeds which constitute the coffee of commerce. Normally there are two seeds, but in some varieties there is a tendency for

one seed to mature, leaving the other undeveloped ; this is the "peaberry" coffee of commerce. The so-called Mocha coffee is a peaberry, as is also much of the Mexican coffee.

"Mocha" coffee

In their preparation the berries are picked when ripe and deprived of their pulp. After pulping they are cured in the sun for about a week and then hulled, or divested of the endocarp, a process requiring expensive machinery. The coffee is then cleaned, and sacked.

Preparation

The value of the product depends on two factors, age and the care with which it is sorted. Formerly, in the Dutch East Indies, coffee-growing, for the greater part, was a government privilege, and the crop was kept for several years in storage before it was permitted to be sold—therefore the term "Old Government" Java. Other coffee was designated as "Private Plantations." The quality of coffee is greatly improved with age. Brazilian and other American coffee-beans are rarely seasoned by storage.

Factors in quality

Seasoning

American coffees are almost wholly sorted by machinery. This process, however, merely collects beans of the same size ; it still leaves the good and the bad beans together, though it is to be said that among the largest beans there are fewer poor ones. In the coffees handled by the Arab dealers all the sorting is done by hand, the very choice grade selling in the large cities of Europe for the equivalent of nearly three dollars per pound. All machine-sorted coffee is greatly improved by a subsequent hand-sorting to remove the imperfect beans.

Hand sorting of the berries

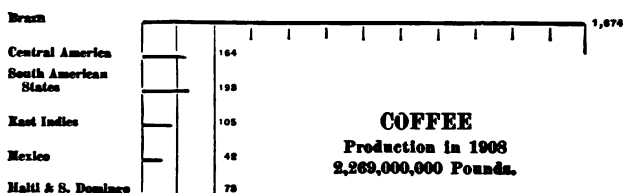
The naming of the different kinds of coffee is somewhat arbitrary. Thus, Brazilian coffees are commercially known as *Rio* because they are shipped from the port of Rio de Janeiro ; the same name is applied to the product shipped from Santos. Nearly all Venezuela coffees are called *Maracaibo* although they differ much in kind and quality ; most Central American coffee is sold as *Costa Rica* ; most

Commercial nomenclature

peaberry varieties are known as *Mocha*; and most of the East India product is popularly called *Java*, no matter whence it comes.

Commerce
of different
varieties

Of the American coffees Rio constitutes about half the world's product. After sorting, the larger beans are often marketed as Java coffee, and when the beans have been roasted it is exceedingly difficult to tell the difference. The best Maracaibo is regarded as choice coffee, but its flavor is not liked by all coffee-drinkers. The best Honduras and Puerto Rico coffees take a high rank and command very high prices, retailing in some instances at sixty cents per



pound. A very choice peaberry is grown in the volcanic soils of Mexico to which the name of *Oaxaca* is given; most of it is sold in the United States as a choice Mocha.

Commerce
of Mocha
coffee

Mocha is the commercial name of a coffee at one time marketed in the Arabian city of that name. Since the completion of the Suez Canal, Hodeida has been the chief centre of the Arabian coffee-trade. Formerly most of this coffee was grown in the Province of Yemen, but now it is brought to Hodeida, from Egypt, Ceylon, and India.

Markets
for Mocha
coffee

About all the product is hand-sorted. The choicest is sold in Constantinople, Cairo, and other cities near by, in some instances bringing five dollars per pound. Very little, and only that of the most inferior quality, ever finds its

way into western Europe or the United States. Even the best Mocha is not superior to fine Oaxaca coffee.

Java coffee is renowned the world over for its fine flavor. The best quality was formerly that which had been held in storage to season for a few years. The government coffee was generally the better, but some of the private plantations crop is now equally good. Some of the Sumatra coffees are equal to the best Java beans.

Qualities
of Java
and
Sumatra
coffees

The Liberia coffees have never been favorites in the United States on account of their flavor. In Europe they are used for blending with other varieties.

Uses of
Liberia
coffee

Of the entire coffee-crop of the world, the United States consumes nearly a billion pounds—a yearly average of very nearly twelve pounds for each inhabitant. This is about three times as much per inhabitant as is consumed in Germany, and almost fifteen times the average used in Great Britain. Nearly all the world's crop is consumed in the United States and western Europe.

World's
product

Consump-
tion per
inhabitant

Chicory, parched grain, pease, and burnt parsnip are sometimes added as adulterants to ground coffee. Of those, chicory most nearly resembles coffee in flavor and taste. It is harmless and usually improves the flavor of inferior coffee. A tariff recently placed upon chicory has somewhat lessened the use of it.

Adulter-
ants of
coffee

Tea.—The tea of commerce consists of the dried and prepared leaves of an evergreen shrub (*Thea chinensis*) belonging most probably to the *camellia* family. Tea has been a commercial product of China for more than fourteen hundred years, but seems to have been carried thither from India about five hundred years before the Christian era; for its virtues were praised by (the probably mythical) Chinung, an emperor of that period.

History

The cultivated plants are scarcely higher than bushes, but the wild plant found in India is a tree fifteen or

Method of
cultivation

twenty feet in height. The cultivated plant is quite hardy; severe winters kill it but ordinary freezing weather merely retards its growth. It thrives best in red, mouldy soils; the choicest varieties are grown in new soils. The leaves are not picked until the plants are three or four years old.

Two general classes of tea are known in commerce—the green and the black. Formerly these were grown on different varieties of the plant, but in the newer plantations no distinction is made in the matter of variety; the color is due wholly to the manner of preparation.

The plants are watched carefully during the seasons of picking, of which there are three or four each year. The April picking yields the choicest crop of leaves, and only the youngest leaves and buds are taken.* A single plant rarely yields more than four or five ounces of tea yearly. Each acre of a tea-garden yields about three hundred and fifty pounds.

After picking, the leaves are partly crushed and allowed to wilt until they begin to turn brown in color. They are then rolled between the hands and either dried very slowly in the sun, or else rapidly in pans over a charcoal fire—a process known as “firing.” The former method produces *black*, the latter *green*, tea. The color of the latter is sometimes heightened by the use of a mixture of powdered gypsum and Prussian blue. In the black teas the green coloring matter of the leaf is destroyed by fermentation; in the green teas it remains unchanged.

The greater part of the Chinese tea designed for export is packed rather loosely in wooden chests lined with sheet-lead, the folds and joints of which are soldered in order to make the cover both air-tight and moisture-tight. A full chest contains seventy-five pounds of tea. The Japan

* The full-grown leaf attains a length of from four to nine inches; those picked rarely exceed one-and-a-half inches in length.

product is also packed in moisture-tight wrappers, the original parcels being usually ten-pound, five-pound, and pound packages. Similar devices are used in preparing the India and Formosa teas for ocean shipment.

The chief tea-producing countries are India (including Ceylon) China, Japan (including Formosa), and Java. A successful tea-garden is in operation near Charleston, S. C. A small amount is grown in the Fiji and Samoan Islands. The Ceylon and Formosa teas take a very high rank.

Regions of
production



Great Britain and her colonies consume the bulk of the tea-crop. The average yearly consumption per person is eight pounds in Australia, six in Great Britain and Cape of Good Hope, and more than four in Canada. In the United States it is a little more than one pound per person; in Russia, about one pound.

Consump-
tion

Before the opening of the Suez Canal, in 1869, most of the crop for the English market was despatched by way of Cape of Good Hope. So important was it to get the consignments to London without loss of time, that fast clipper ships were built especially for carrying tea. Since the open-

Commerce

ing of the canal the crop has been shipped mainly by the Suez route.

Trans-
portation
to
American
markets

A part of the tea required for the United States reaches New York by way of the Suez Canal, but the movement is gradually changing since the building of the fast liners that now ply between Asian and American ports. These steamships carry it to Seattle, or to Vancouver, whence it is distributed by rail. The increased cost of shipment by this route is more than offset by a gain of from five to seven days in time.

Trans-
portation
to
European
markets

In some respects the Russian "caravan route" is the most important channel of the tea-trade. The tea is collected mainly at Tientsin, and sent by camel caravans through Manchuria to the most convenient point on the Siberian railway. Not only the shipments of brick tea* for the Russian market, but the choicest products for western Europe also are sent by this route. It is probably an economical way of shipping the brick tea, but a more expensive method of shipment for the latter could not be found easily; it is preferred from the fact that, no matter how carefully sealed, the flavor of tea is materially injured by an ocean voyage.

Brick tea

Overland
routes
for tea

Shipments
over
Siberian
Railway

It is evident, therefore, that for the tea product alone the Siberian railway will soon become an important factor in the commerce of Europe. Shipments of tea are also sent from Canton to Odessa, Russia, but this route is not less expensive in the long run than the Cape route, and the tea suffers as much deterioration from the shorter as from the longer voyage.

Origin

Cocoa.—The cocoa, or cacao, of commerce, consists of the prepared seeds of several species of *Theobroma*, the greater part being obtained from the *Theobroma cacao*.

* Brick tea consists of leaves moulded into bricks under heavy pressure. Refuse and stems are also thus prepared for the cheaper grades.

The name is unfortunately confused with that of the cocoa-palm, but there is no relation whatever between the two.

The seeds of the cacao were used in ancient America long before its discovery by Columbus, and the latter carried the first knowledge of it to Europe. By the middle of the seventeenth century it was much used in Spain, and less than a hundred years later it had become the fashionable drink of western Europe.

History

The cacao-tree, originally native to Mexico, is now cultivated throughout tropical America and the West Indies. It is not cultivated to any extent in the Eastern continent. The fruit consists of large, fleshy pods, which are cut from the trees usually in June and December. The seeds are then piled in heaps, or else packed in pits, and allowed to undergo a rapid fermentation for a period of several days, to which process their flavor is mainly due. The roasted and broken seeds are the cocoa-nibs of commerce. The husks are known as cocoa-shells.

Preparation

Manufacture

A very large part of the cacao product comes from Ecuador, Guayaquil being perhaps the chief market of the world. The Venezuelan and Brazilian products, however, are the choicest; these are known in commerce respectively as Caracas and Trinidad cacao. Spain, Portugal, and France are the chief purchasers, and in the first-named country the consumption per person is five or six times as great as in other countries.

Regions of production

Consumption

Cocoa is not only a stimulant beverage, but a food as well; about one-half its weight is fat, and about one-third consists of starch and flesh-making substances. The stimulant principle is the same as that occurring in tea and coffee, but the proportion is considerably less. In preparing the cocoa for the market, much of the fat is intentionally withdrawn. The fat, commercially known as "cocoa-butter," and "oil of theobroma," does not turn rancid.

Food value

Cocoa butter

Chocolate consists of cocoa ground to a paste with sugar and flavoring matter, and then cast in moulds to harden. It is used mainly in the manufacture of confectionery. Most of the chocolate is made in France, Spain, and the United States. More than sixty million pounds of cocoa are yearly consumed in the United States.

Regions of production **Maté.**—Maté, yerba maté, or Paraguay tea, is the leaf of a shrub, a species of holly, growing profusely in the forests of Brazil, Paraguay, Argentina, and Uruguay. In many instances, the shrub is cultivated. The leaves are prepared in much the same manner as tea-leaves are, but instead of being rolled, they are broken by beating.

**Manu-
facture** The maté of commerce has a stimulant principle identical with that of tea and coffee, which is the only reason for its use. The consumption, about fifteen thousand tons a year, is confined almost wholly to the countries named.

**Consump-
tion** **Tobacco.**—The tobacco of commerce is the prepared and manufactured leaf of several species of plant, belonging to the nightshade family. Most of the product is derived from the species known as Virginia tobacco (*Nicotiana tabacum*) and the Brazilian species (*Nicotiana rustica*). The former is cultivated in the United States, West Indies, the Philippine Islands, and Turkey; the latter has been transplanted to central Europe and the East Indies.

**Origin and
distribu-
tion** The use of tobacco was prevalent in the New World at the time of Columbus's first voyage, and was quickly introduced into Europe. The prepared leaf contains a substance, nicotine, which is one of the most deadly of poisons when swallowed, and an intense narcotic stimulant when inhaled. On account of the evil effects arising from its introduction, its use was forbidden by the Church and also by sovereigns of several European states. The latter, however, finding that its use was becoming general, made it a

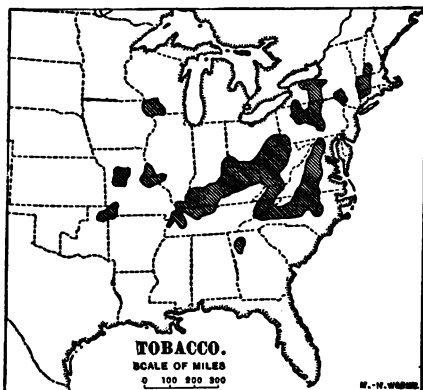
**Prepara-
tion**

Uses

Crown monopoly. In Great Britain its cultivation was forbidden in order to encourage its cultivation in Virginia.

Tobacco does not thrive best in a poor soil, but the latter produces a thin, half-developed leaf, which in other plants would be called "sickly." It grows in almost any kind of soil, but requires warm summer nights. In many instances the tobacco of temperate latitudes yields a more salable leaf when grown under cover. The flavor is due partly to soil and climate, and partly to skill in curing.

The choicest product is obtained in only a few localities of limited area. It sometimes happens that the products of two plantations almost side by side, and similarly situated, are very unlike in character and quality.



Conditions
of growth

Quality

The choicest cigar-tobacco is grown on the Vuelta Abajo district in the province of Pinar del Rio, Cuba; another very choice Cuban leaf is known as Partidos. Cuban-made cigars of fine quality are commercially "Havana" cigars, although tobacco from Manila and Porto Rico is apt to be largely used in their manufacture. In order to avoid the very heavy duty on cigars, which is not far from six dollars per pound, a great deal of the Havana tobacco is exported to points along the Florida coast, mainly Key West and Tampa. The unmanufactured tobacco pays a comparatively small duty, and the cigars made from it are commercially known as "Key West."

Cuban
product

Reasons
for
manu-
facture in
Key West
and Tampa

Quality of
Brazilian,
Porto
Rican,
Manila, and
Sumatra
leaf

In some parts of Mexico a fine-flavored tobacco is grown, but as the cigars are not uniform in quality they are not popular. Some of the Brazilian tobacco is a high-class product, but not much is exported. Porto Rican leaf has a fine flavor, but is not popular because of its dark color. The demand for it in the United States is growing, however. Of the leaf grown in the East, that from Sumatra and the Philippine Islands is by far the best, and the exports are heavy. Cuban manufacturers purchase the Manila leaf; the Sumatra wrappers are purchased in the United States.

Cigarette
tobacco

The choicest cigarette-tobacco is grown in Asiatic Turkey, Transcaucasia, and Egypt. It is selected with great care, and is "long-cut." The common grades are made of chopped Virginia tobacco, or of chopped cigar-trimmings. The cheapest grades consist of refuse leaf mixed with half-smoked cigar-stumps. The United States leads in the manufacture of cigarettes, and a large part of the product is sold in China, India, and Japan. Most of the world's product of snuff is made in the United States, and nearly all of it is sold abroad.

Snuff

Production
in United
States

The United States produces yearly about seven hundred million pounds. A large part of this is sold to European countries. Great Britain purchases about four-fifths of the tobacco there consumed from the United States. The latter country purchases from Europe (mainly the Netherlands) about half as much as it sells to Europe. Louisville, Ky., is probably the largest tobacco-market in the world. New York, Baltimore, Richmond, Manila, and Havana are the chief shipping-ports.

Markets

Heavily
taxed

In almost every civilized country tobacco is heavily taxed. In the United States there is not only a heavy import duty, but an internal revenue in addition. In Austria, France, Italy, Japan, and Spain the manufacture and

sale is in the hands of the government. In the Netherlands the consumption of tobacco averages about seven pounds a year to each individual ; in the United States it is more than five pounds ; in central Europe, three pounds ; and in Great Britain, two pounds. In the United States the use of tobacco costs about seventy million dollars yearly.

Consumption per individual in various States

Opium.—The opium of commerce is the hardened juice obtained from the seed capsules of several species of the poppy-plant. A variety having a large capsule (*Papaver somniferum*) is most commonly cultivated for the commercial production of the substance. Half-a-dozen times during the season the capsules are scratched or cut ; the juice exuding when hard is picked or scraped off and pressed into cakes.

Method of preparation

Opium is not only a narcotic poison, but it has the property of lessening the pain of disease, and this is its chief use in medicine. In Mohammedan countries where the use of alcoholic liquors is forbidden as a religious custom, opium is used as a substitute. In Turkey, Persia, Arabia, and Egypt the production of opium is an important industry connected with social and religious life. In British India it is a political factor, being extensively cultivated as a government monopoly to be sold to the Chinese, who are probably the chief consumers of it. The Indian Government derives a revenue sometimes reaching twenty million dollars from this source.

Uses

A social factor

A government monopoly

The best quality of opium is marketed at Smyrna, and most of this is purchased by the United States. A considerable amount of Chinese opium is imported for the use of the Chinese, and a larger amount is probably smuggled over the Canadian and Mexican borders. Laudanum is an alcoholic tincture, and morphine an extractive of opium ; both are used as medicine.

Markets

By-products

QUESTIONS FOR DISCUSSION

Consult a good physiology and learn the effects of coffee, tea, tobacco, and opium.

Where and what are the following: Mocha, Java, Maracaibo, Yokohama, Amoy, Canton, Oaxaca, Hodeida, Rio Janeiro, Santos, Havana; how is each connected commercially with this chapter?

From the map, Fig. 1, trace the route of a cargo of tea overland from China to Great Britain.

Consult an English history or a cyclopædia and learn about the opium war.

FOR STUDY AND REFERENCE

Obtain samples of the following, preserving them for study and inspection in closely stoppered vials: Mocha, Java, Rio, and Sumatra coffees; green, black, and gunpowder tea. Soak a tea-leaf a few minutes in warm water; unroll the leaf and attach it to a white card, for study.

Obtain samples of gum opium, laudanum, and morphine; note the odor of the first two and the taste of the last. Remember that they are poisonous.

Unroll a cheap cigarette and note the character of the tobacco in it, using a magnifying glass.

CHAPTER XI

GUMS AND RESINS USED IN THE ARTS

MOST vegetable juices exposed to the air harden into firm substances, commonly called *gum*. Some of these dissolve, or at least soften, in water; these technically are known as “gums,” and usually are so designated in commerce. Others are insoluble in water, but dissolve readily in alcohol, in naphtha, in turpentine, or in other essential oils; these are designated as “gum-resins.” Still others yield oils or pitchy substances on distillation; these are known as “oleo-resins.” There are many other dried vegetable juices, however, that in commerce are not classified among the gums and resins, and of these the most important is the substance commonly known as india-rubber.

Distinction
between
gums and
resins

Oleo-resins

Rubber and Rubber Products.—“Caoutchouc” is approximately the name given by Indians of the Amazon forests to a substance that had also been found in India. Some of it was brought to Europe from the Amazon region as early as 1736, and for nearly one hundred years no general purpose was discovered for which it could be used, except to erase lead-pencil marks—hence the name india-rubber, which has held ever since.

History

Uses

Common rubber is the prepared juice of a dozen or more shrubs and trees, all of which grow in tropical regions.* The belt of rubber-producing plants extends around

Derivation

* The following are the chief rubber-producing trees: *Siphonia elastica*, or *Hevea brasiliensis*, Amazon forests, yields Pará rubber; *Manihot Glaziovii*, a tapioca-producing shrub, Ceará province, Brazil, furnishes Ceará rubber; *Castilloa elastica*, Central American States, Nicaragua rubber; *Ficus elastica*, British India, and *Urceola elastica*, Borneo, Indian rubber. The rubber trees of Florida have but little commercial value. African rubber is taken from a variety of plants. The bark of a Mexican shrub, *guayule*, contains about ten per cent. of rubber gum.

Rubber-
producing
plants

the world and includes such well-known species as the fig, the manihot (or manioc), and the oleander; indeed, it is a condition of sap rather than a definite species of plant that produces rubber, and the latter is a manufactured rather than a natural product. The process of preparing the juice is practically the same in every part of the world.

Prepara-
tion of sap

The rubber-gatherer of the Amazon, who is practically a slave, wades into the swamp, makes several incisions in the bark of the tree, fashions a rough trough of clay under it, and waits till the sap fills the clay vessel. When the sap has been gathered he makes a fire of the nuts of the urucuri palm and places an inverted funnel over it to concentrate the smoke. He first dips the end of a wooden spindle into the juice and then holds it in the smoke until the juice coagulates; this process is repeated until there has formed a ball of rubber weighing from five to ten pounds. The smoke of the palm-nuts is a chemical agent that converts the juice into the crude rubber of commerce.

Vulcaniza-
tion

Crude gum, however, is lacking both in strength and elasticity. The process that makes it a finished product is known as *vulcanization*. The crude rubber is shredded, washed, and cleansed, and partly fused with varying proportions of sulphur. For a very soft product, such as the inner surface of tires, only a small proportion is used; where the wear is considerable, a larger proportion is employed.* Clay, whiting, litharge, and lampblack are sometimes added to give body and color to the product.

Adulter-
ants

Regions of
production

By far the greater part of the crude rubber comes from the Amazon forests. The uplands of the Amazon pro-

Process of
vulcaniza-
tion

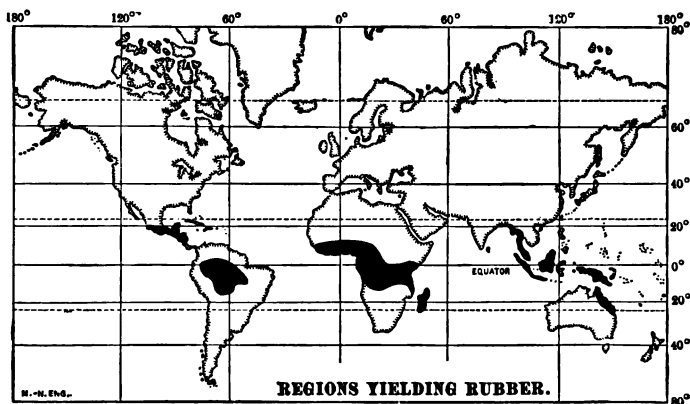
* The process of vulcanizing was made practicable during the ten years ending in 1850. It was invented and perfected by Goodyear in the United States and by Hancock in England; for ordinary purposes, where both strength and elasticity are required, about five per cent. of sulphur is added. The addition of about fifty per cent. changes the rubber to a hard black substance known as "ebonite," or "hard rubber."

duce about one-half. Most of this product, that of the Ceará region excepted, is collected at Manaus and is marketed at Pará. It is known as Pará rubber. It is the best produced. The African product, mainly from the forests of the Kongo, and Madagascar, and nearly all the East Indian product are sent to Europe. The Hevea tree is now extensively cultivated in tropical America and the East Indies.

Pará
rubber

Regions of
cultivation

The world's product is about two hundred million



pounds of crude rubber. Of this product the United States takes nearly one-half. The greater part is used in the manufacture of automobile tires, hose, and overshoes. A large part is used for making water-proof cloth,* and considerable is made into the small elastic bands for which there is a growing use.

World's
product

Uses

* In 1823 a Scotchman, Mackintosh, applied the discovery, that rubber gum was soluble in benzine, to the water-proofing of the cloth that bears his name. This invention was about the first extensive commercial use to which rubber had been put.

Occurrence	<p>Gutta-Percha. — Gutta-percha is obtained from the juices of several plants (chiefly <i>Dichopsis gutta</i> and <i>Sapota mülleri</i>) both of which abound in the Malay peninsula and the East Indies. It is prepared in a manner somewhat similar to that employed in making crude rubber; it is also easily vulcanized by heating with sulphur. It is used to a limited extent in the manufacture of golf-balls, but mainly as the insulating cover of copper wires used in ocean telegraph cables. For this purpose it has no known substitute, and its essential merit is the fact that it is not altered by salt water. Nearly all the product is shipped from Singapore to England.</p>
Preparation	
Uses	
Markets	

Pine-Tree Products.—The various members of the pine and cone-bearing trees yield valuable essential oils and oleo-resins that are very important in the arts and sciences. These, in nearly every instance, are prepared from the sap of the tree.

Region of production	<p><i>Oil of turpentine</i> is known as an "essential oil," and in chemical structure and properties it does not differ from the various essential oils, such as lemon, orange, peppermint, etc. Commercial turpentine is generally made from the sap of the long-leaved pine of the Atlantic coast-plain.</p>
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Preparation	<p>The bark of the tree is cut near the foot, and the sap that oozes from the scar quickly hardens into a gum. The gum, generally known as "crude turpentine," is distilled and yields about one-fourth its weight of oil or "spirit" of turpentine. It is a staple article of manufacture in Europe, India, and the United States, and is used chiefly to dilute the oil paints and varnishes used in indoor work. The United States supplies about two-thirds of the world's product, a large part of which is shipped from Savannah and Brunswick, Ga., to Great Britain.*</p>
Uses	
Product of United States	

* From the fact that most of the dwellings in the United States are built of wood, the United States is a very heavy consumer of turpentine.

Rosin is the substance remaining after the crude turpentine has been distilled. It is used in the manufacture of varnish, sealing-wax, and soap. Finely powdered rosin is also mixed with wood-pulp in the manufacture of wrapping-paper. It gives the latter a glazed surface and renders it almost water-proof. Most of the world's product of rosin comes from the turpentine district of the United States, and about four-fifths of it is exported to Europe.

Manu-
facture

Uses

World's
product

When rosin is subjected to distillation at a still higher temperature, *rosin oil*, a very heavy turpentine, is given off, and a viscous substance known as *pitch* remains. A considerable amount of this is still made in the United States, but the greater part comes from the pine-forests of Russia and Scandinavia. When pine-wood is distilled, *tar* is the chief product. In Russia, tar is generally made by burning green logs covered with turf, over a pit. *Creosote*, or wood preservative, is made from tar. The various pine-tree products, creosote excepted, are commonly known as "naval stores," the tar being used in water-proofing the rigging of vessels, the pitch in calking the seams in between planks, in the decks and hulls.

Rosin oil
Pitch

Creosote

Uses of
naval
stores

Other Resins and Gums Used in the Arts.—Most of the gums and resins used in the arts and sciences are the hardened sap of plants—in some cases exuding by natural means from the bark, in others resulting from the puncture of the bark.

Origin

The *lac* of commerce is due to the puncture of the young branches of a tree, frequently a fig (*Ficus religiosa*) growing in the tropical forests of India. The hardened sap incrusts twigs forming *stick-lac*; when crushed, washed, and freed from the woody matter it is *seed-lac*; when melted and cooled in flakes it is *shell-lac*, the form best known in commerce. It is the chief ingredient in sealing-

Prepara-
tion and
uses

wax, and is extensively used as a varnish. It is also used in fireworks on account of its inflammability.

Dammar is the product of a tree growing in the East Indies; it is the basis of a very fine white varnish. *Copal* is a term applied to oleo-resins soluble in turpentine, and used almost universally as varnishes. They come from the tropical regions of South America, Africa, and from the East Indies. *Kauri* is the fossil gum of a cone-bearing tree dug from the ground in northern New Zealand. *Amber* is the fossil gum of extinct cone-bearing trees found mainly along the Baltic coast of Prussia. It is used chiefly for the mouth-pieces of tobacco-pipes and cigar-holders; the inferior product is made into varnish. It is sold wherever tobacco is used. *Sandarach*, found on the north African coast, is used principally in Europe, being employed as a varnish. The United States and Great Britain consume most of the foregoing products.

Oleo-resins
used for
varnishes

Amber

Sandarach

QUESTIONS FOR DISCUSSION

Name any elastic substance you know about that is in every way a substitute for rubber.

What has been the relation between rubber and good roads?

Describe the structure of a bicycle tire.

Why are tar, pitch, and turpentine called naval stores?—and what determines the locality in which they are made?

What is varnish, and for what purposes is it used?

FOR STUDY AND REFERENCE

Obtain specimens of crude rubber, vulcanized rubber, and hard rubber; note carefully the characteristics of each.

Burn a very small piece of cheap white rubber-tubing in an iron spoon or a fire-shovel; note the character of the residue.

Obtain specimens of gutta-percha, resin, pitch, turpentine, shellac, copal, dammar, and creosote for study and inspection.

CHAPTER XII

COAL, PETROLEUM, AND OTHER MINERALS

THE economic history of nearly every country that has achieved eminence in modern times dates from its use of coal and iron ; and indeed the presence of these substances in workable deposits means almost unlimited power. The present era is sometimes called the Age of Steel, but the possibilities of producing steel in enormous quantities, at less than one-fifth its price at the beginning of the nineteenth century, depended mainly upon the use of mineral coal instead of charcoal in its manufacture.

Reason for
Age of
Steel

Coal.—Coal consists of accumulations of vegetable matter that were formed in prior geological ages. Under the action of heat and moisture, and also the tremendous pressure of the rock layers that afterward covered them, the vegetable matter was converted to mineral coal.

Origin

The aggregate coal-fields of the United States are not far from two hundred thousand square miles in extent, of which about one-half is workable. In Europe there are about one hundred thousand square miles of coal-lands, of which about half are productive. Of this, Great Britain has 12,000 square miles, Russia 27,000, France 2,000, Germany 3,600, and Belgium 500. In Canada there are about 20,000 square miles of coal-land ; a part of this is on the Pacific coast, but the most important are the Nova Scotia beds, which form about the only supply for the British naval stations of America. China has the most extensive coal-fields in the world. The world's visible supply of coal is estimated at nearly one thousand years' consumption.

Chief coal-
fields of
the world

World's
visible
supply

Occurrence
and
character
of anthra-
cite coal

In character coal is broadly divided into two classes—anthracite or hard, and bituminous, or soft coal. Anthracite coal occurs in folded and metamorphic rocks. It is hard and glassy, and does not split into thin layers or leaves. The beds have been subjected to intense heat and pressure, and the coal has but a very small amount—rarely more than five per cent.—of volatile matter; it burns, therefore, with but little smoke and soot, and on this account is very desirable as a fuel in cities. Two areas in Colorado and New Mexico produce small quantities of pure anthracite; practically all the commercial anthracite comes from three small basins in Pennsylvania. In quality it is known as “red ash” and “white ash.”

Con-
sumption
and prep-
aration

The yearly output of the anthracite mines is upward of seventy-five million tons a year. In winter the rate of consumption is somewhat greater than that of production. A shortage in the summer production is therefore apt to be keenly felt in the winter. Before shipment to the market the coal is crushed at the breakers, sorted in different sizes, and washed. Much of the slack and refuse is now moulded into briquets, which make excellent fuel.

Railway
ownership
of coal-
mines

“Coal
roads”

Canal
trans-
portation

Most of the anthracite coal-mines are owned by the railway companies centering at New York and Philadelphia, or else are operated by companies controlled by the railways. About one-fourth of the output is produced by independent operators who, as a rule, sell their coal to the railway companies. The Reading, Pennsylvania, Central of New Jersey, Lackawanna, Lehigh Valley, Ontario & Western, Erie, and Delaware & Hudson railways are popularly known as “coalers” because the larger part of their eastern business consists in carrying anthracite coal.

Formerly much of the coal was shipped by canals, but the latter were not able to compete with the railways, and most of the coal-canals have been abandoned. The price



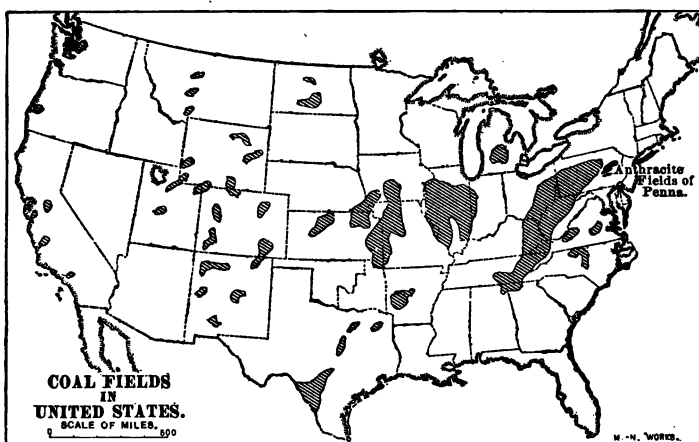
A VIEW OF THREE COLLIERIES IN THE ANTHRACITE COAL BASIN NEAR MAHANOEY CITY, PA.

Prices of
different
sizes

of anthracite at tide-water is not far from five dollars per ton. Steam sizes, such as "pea" and "buckwheat," are about two-thirds the price of house sizes. The price of anthracite coal is constantly increasing.

Properties

Bituminous, or soft coal, furnishes the larger part of the steam fuel in the United States, and nearly all the steam fuel used in other parts of the world. It contains from fifteen to more than forty per cent. of volatile matter, burning with a long and smoky flame. The coal which con-



Caking
coals

tains twenty per cent. or less of volatile matter is a free-burning coal that may develop heat enough to partly fuse the ash, forming "clinkers"; it is therefore called "caking" coal, and is not only well adapted for use as fuel and steam-making, but it is also a good smelting coal.

Fat coals

Coal which contains more than thirty per cent. of volatile matter is known as "fat" coal and is generally used in the manufacture of coke and illuminating gas. Western Pennsylvania produces the largest amount of fat coal, but it is found here and there in nearly all soft-coal regions. A so-called smokeless bituminous coal occurs in various

localities; its low percentage of volatile matter makes it an excellent house fuel.*

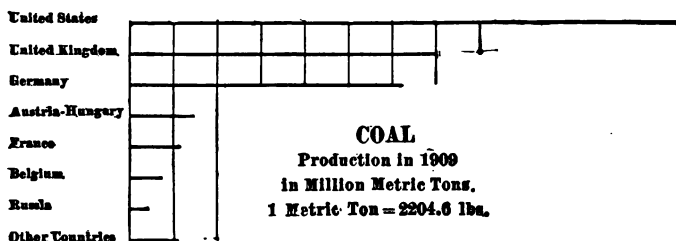
Bituminous coal is mined in twenty-five States of the Union, Pennsylvania, Illinois, West Virginia, and Ohio heading the list. In about half the mines the coal is cut from the seam by means of machinery and is known as machine-mined coal. A very large part of the product is consumed within a short distance of the mines, and this is especially true of the region about the upper Ohio River.

Most of the product is shipped to the large manufacturing cities of the middle west, where it is used for steam as well as house fuel; a very large amount also is sent

Occurrence

Consumption

Uses



down the Ohio in barges to the lower Mississippi River. The value of bituminous coal at the mines varies from one to two dollars per ton.

Spot value per ton

The output of the mines of the United States aggregates about three hundred and eighty million long tons yearly, and this is about one-third of the world's product. For many years there has been an export trade to Canada, the West Indies, Central and South America, amounting in 1909 to 12,000,000 tons. Within a few years, however, the decreased cost of mining due to machinery, and the low rates

Production in United States

*The real value of coal can be estimated only by finding the heat energy that it contains, and the latter is estimated usually in *British thermal units*. Each B. t. u., as it is commonly denoted, is the amount of heat required to raise one pound of water at its maximum density, 39° F., one degree, F., in temperature. A *caloric*, the metric unit, is .55 B. t. u. Good bituminous coal should contain from 13,000 to 16,000 B. t. u's. Coal running below 10,000 B. t. u's is very inferior.

Fuel value

Export
trade

of transportation to the seaboard has developed an export trade to Russia, Germany, and France.

Import
trade

A small amount of coal is imported into the United States. A superior quality of Australian coal finds a ready market in Pacific coast points as far north as San Fran-

U. S.	Rest of the World
-------	-------------------

COAL

cisco, and large quantities of Nanaimo, B. C., coal are sold in Oregon, Washington, and California. A small quantity

of the "slack" or waste of the Nova Scotia mines is imported to Boston to be made into coke. The Canadian fields supply a considerable part of the coal used in Montana.

Reasons
for
manu-
facture of
coke

Coke and Coal-Tar Products.—In the manufacture of iron and steel a fuel having a high percentage of carbon free from volatile matter is essential. The great cost of wood charcoal forbids its use, and so a charcoal made from soft coal is used. Fat coal is heated in closed chambers until the volatile matter is driven off. The product is "coke"; the closed chamber is an "oven." The ovens are built of stone or fire-brick, in a long row. They are usually on an abrupt slope, so that the coal can be dumped into the top, while the coke can be withdrawn from the bottom, to be loaded into cars.

Arrange-
ment of
coke ovens

Proportion
of coke
in coal

Scientific
ovens

Use of
refuse
and slack

About three thousand one hundred and forty pounds of coal are required to make a short ton of coke; from three thousand to five thousand cubic feet of illuminating gas, together with varying amounts of coal-tar and ammonia, are driven off and generally wasted. In a few instances "scientific" ovens are in use for the purpose of saving these products; but in the coal-mining regions such devices are the exception and not the rule. The great waste of energy-products in the manufacture of coke is partly offset by the employment of refuse and slack, which could not be otherwise used.

There are about five hundred thousand coke-ovens in use in the United States. Most of them are in the region about the upper Ohio River, and nearly half the total number is in the vicinity of Connellsville. The region around Birmingham, Ala., ranks next in number. The coke product of the United States is not far from thirty million tons a year. A small amount of coke is imported, mainly to Boston, and a small part of the product is exported.

Number
of coke
ovens in
United
States

Most of the "scientific" ovens are near or in large cities where the gas, after purification, is used for illuminating purposes. In some instances the coke, and not the gas, is a by-product. The coal-tar is used in part for fuel, but a portion of it goes to the chemical laboratory, where it is made to yield ammonia, benzine, carbolic acid, and aniline dyes to the value of nearly seven million dollars. A considerable part is used for "oiling" streets.

By-
products
of
scientific
ovens

Uses of
coal tar

Graphite.—Graphite, plumbago, or "black lead," as it is popularly named, is found in many parts of the United States, but only a few localities produce a good commercial article; these are Ticonderoga, N. Y., which yields from six hundred to two thousand tons a year, and Chester County, Pa., which yields a small but increasing amount; a good quality is mined near Ottawa, Canada. Most of the ordinary quality is mined in the island of Ceylon. A very fine grade used in lead pencils is obtained from the Alibert mine, in Siberia. The finest quality obtainable is now manufactured artificially at Niagara Falls.

Occurrence

Graphite is used as a stove polish and for crucibles; in the main, however, it is employed in the manufacture of lead * pencils; for this purpose only a very soft mineral,

Use for
pencil
manu-
facture

* A slender strip of metallic lead was used instead of graphite in the first pencils made. The use of graphite did not become general until about 1850. The hardness of a pencil is regulated by mixing clay with the powdered graphite. Inferior graphite is sometimes mixed with wax.

Adultera-
tion

absolutely free from grit, is employed, and the Siberian output is used almost wholly. One German firm and three American firms supply most of the pencils used.

Compo-
sition

Petroleum.—Petroleum is the name given to a natural liquid mineral from which the well-known illuminating oil “kerosene” is derived, and to obtain which it is mined. Petroleum is a mixture of various compounds known as hydrocarbons. Some of these compounds are gaseous, some are liquid, and some are solid; all of them are articles of commercial value. The petroleum from different localities differs greatly in appearance and composition.

History

The pitch that coated Noah’s ark, the slime of the builders of the Tower of Babel, and the slime-pits of the Vale of Siddim all refer to mineral products associated with petroleum. Under the name of “naphtha” it has been known in Persia for thirty centuries, and for more than half as long a flowing oil spring has existed in the Ionian Islands. The Seneca Indians knew of a petroleum spring near the village of Cuba, N. Y., and used it as a medicine long before the advent of the white man.

Discovery
in United
States

As early as 1850 illuminating oil, known as “coal” oil, was made in the United States by distilling cannel coal, but this product was supplanted within a few years by the natural petroleum discovered in Pennsylvania. In 1859 Colonel Drake completed a well bored in solid rock near Titusville, Pa. The venture proved successful, and in a few years petroleum mining became one of the great industries of the United States.

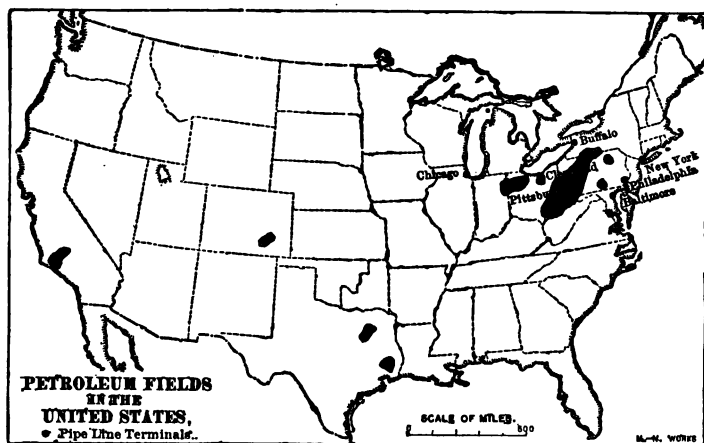
Occurrence

Petroleum is known to exist in a great many parts of the world; the United States and Russia, however, produce practically all the commercial product; a very small amount is obtained from a horizon on the south slope of the Carpathian Mountains, situated in Rumania and Galicia,

Austria-Hungary. There are also a few producing wells in Peru, Germany, Italy, Burma, Argentina, and Sumatra.

In the United States the chief horizon is that of the Appalachian region. Since 1859 it has produced more than forty billion gallons of crude oil. The Indiana horizon has been a great producer, but the wells of California have far surpassed both regions combined. The total production in 1913 was two hundred and twenty million barrels—more than that of the whole world in 1900. Cali-

Occurrence
in United
States



ifornia and Texas horizons have become very important factors. The crude petroleum is transported chiefly by means of pipe-lines flowing from one pumping station to another by gravity. There are pipe-line terminals on the Great Lakes and at Pittsburg, but the principal are at the refining and exporting stations in New York, Philadelphia and Baltimore.

Pipe-line
transportation

A considerable amount is exported to European countries to be there refined, but in the main the crude oil is refined before exporting it. Some of the refined oil is exported

Methods
of export

Commer-
cial
control

Distribu-
tion

Value of
product

Russian
production

Markets of
Russian
product

By-
products

Uses as
fuel in
motor
engines

in barrels, and some in tin cases; the greater part, however, goes in tank steamers, and from these it is pumped into tanks cars to be distributed. Most of the product is controlled by the Standard Oil Company, and it reaches nearly every country in the world. It is carried into Arctic regions on sledges, and over the African deserts by caravans. Great Britain, Germany and the Netherlands are the chief purchasers and distributors. The value of the annual product of the United States is about one hundred million dollars.

The Russian oil-producing region is on and near the Apsheron peninsula, a small area of Transcaucasia, that extends into the Caspian Sea; the region is commonly known as the Baku field. The petroleum is conveyed by pipe-lines to the refineries at Baku. From this port it is shipped by rail to Batum, and thence to European markets. A considerable part of the product is sent by tank steamers up the Volga to Russian markets. Great Britain takes about one-third; about the same amount is shipped to Port Said for China, India, and other Asian markets; the rest is consumed in central Europe.

Petroleum Products.—The various constituents of crude petroleum are separated by distillation at different temperatures. By this process naphtha, rhigoline, gasoline, benzine, and other highly inflammable products are obtained in separate receivers. By a similar process the illuminating or refined oil and the lubricating oils are also separated. The residuum consists of a gummy mass from which paraffine and petroleum jelly are extracted.

Naphtha usually contains several volatile compounds, including *benzine* and *gasoline*. It is used as a solvent of grease and of crude india-rubber, and also in the manufacture of illuminating gas. As the source of power in gasoline engines and motors, however, it has come to be a necessity that at present has no substitute.

Kerosene is the name commonly given to the refined oil. A good quality should have a fire test of not less than one hundred and fifty degrees; that is, when heated to that temperature, it should not give off any inflammable gas. This test is now mandatory in most States.

Fire test

Lubricating oil is used almost wholly for the lubrication of heavy machinery. It varies greatly in composition and quality.

Uses

Paraffine or petroleum wax has largely superseded beeswax; it is used mainly in the manufacture of candles and as an insulator for electric wires. A native mineral paraffine, known as ozocerite, is mined in Utah and Galicia; it is used as an insulating material.

Uses and occurrence

"*Vaseline*," "*cosmoline*," or petroleum "*jelly*" is very largely used in pharmacy as the basis of ointments and also as a lubricant for heavy machinery.

Uses

Asphalt is produced by the distillation of petroleum, but the greater part of the world's product comes from two "pitch lakes"—one in Bermudez, Venezuela, the other in the island of Trinidad, off the Venezuelan coast. The former is the larger and produces a superior quality. Small deposits occur near Los Angeles, Cal., and in Utah. The output of the Venezuelan asphalt is used almost wholly for street pavement.

Occurrence and uses

Probably no other mineral has had a wider influence on both social and economic life, and the industrial arts, than petroleum and its compounds. The kerosene lamp, the aniline dye, the insulation of electric wires, the lubrication of machinery, the cosmetic, the india-rubber solution, and the physician's sedative dose represent only a few of the devices that are derived from petroleum.

Influence on social life

Natural Gas.—A natural inflammable gas occurs in or near several of the petroleum horizons. One important belt extends through western Pennsylvania and New York,

Occurrence

and another through northwestern Ohio and northeastern Indiana. It is conveyed through pipe-lines and used both as fuel and for lighting. Natural gas occurs in a great many localities, but is used commercially only in the regions noted. It is better adapted for making glass than any other fuel, and on this account extensive glass-making establishments have concentrated in the natural-gas belt of western Pennsylvania.

Other Minerals of Economic Use.—Most of the mineral substances used in the household arts are combinations of sodium, a metal that occurs in the chemical laboratory.

Common Salt, the chloride of sodium, is the chief mineral constituent of sea water. The deposits of rock salt are thought to have been formed by the evaporation of sea water lying in shallow pools, such as the Karabogas, an arm of the Caspian Sea. The salt product of the United States in 1913 was over thirty million barrels, of 280 pounds each. Of this amount Michigan and New York produced about two-thirds. A considerable part of the product is used for preserving hides.

A large part of the salt product is converted into the *bicarbonate of soda* which is used for domestic purposes under the names of "salæratum," "baking powder," "yeast powder," etc. The carbon dioxide, or "carbonic acid gas," set free in various ways, is the agent which makes the bread light and porous.

Borax is also a sodium combination. Most of the product is obtained from the margins of desiccated "sinks" and lakes in arid regions. It is used as a preservative and as a medicine. It is also used in fixing the colors used in decorating porcelain.

Phosphate Rock is used as fertilizer. It contains phosphate of lime in varying proportions. Only those deposits that are near to a railway or a port of shipment are com-

mercially available, however. It occurs extensively in the western highland region of the United States, but the available deposits are mainly in the South Atlantic States.

Clay is the oxide of the metal aluminium. White clays that are suitable for making porcelain wares will stand the expense of shipment for considerable distances. Brick clay, on the other hand, must be sought at no great distance from the places where the brick are to be used. In the vicinity of New York City the price of brick must be low enough to compete with the "steam-cooked" brick made of ashes, sand, and lime.

Marble, a crystalline carbonate of lime, commands a price high enough to stand shipment for long distances. The marble of Vermont has always been greatly prized for sculptured building trimming; that of the Southern Appalachian Mountains is used for panels and inlaid work. A large part of the white marble is used for gravestones. The mineral known as "Mexican onyx" is not onyx at all, but a translucent, variegated marble. It is used in interior work, and takes a beautiful polish. *Limestone* is quarried in many parts of the United States both as building stone and for making lime. As a building stone it is rarely shipped to any considerable distance.

Granite is quarried extensively in the New England States, and much of the product is shipped to considerable distances, the rough ashlar being cut to given dimensions before shipment. Granite takes a fine polish; it varies in color—white, red, and gray-black being the tints most desired. In spite of the large areas in which granite is the outcrop, not much of it is merchantable.

Portland Cement, within a few years, has taken a foremost place among building materials. Formerly a similar preparation was known as "hydraulic" cement, because it hardened under water. The artificial product has almost

Availa-
bility of
deposits

Occurrence

Uses

Orna-
mental
variety

Economic
use

Occurrence

Properties

Properties

Method of
manu-
facture

wholly supplanted the natural cement however. Its name is derived from the island of Portland, England, which yields a colored limestone. The cement itself is made by heating mixed limestone and clay in a rotatory furnace, or kiln, in much the same way in which quick-lime is made. Portland cement is generally used in the form of "concrete," a mixture of one part cement, two of sand, and five of broken rock. In many structures the concrete is built around a skeleton of steel; the structure is then known as "reinforced" concrete. For bridges, buildings, viaducts, dams, and retaining walls, reinforced concrete has no equal. Not far from seventy million barrels are used yearly in the United States.

Uses

QUESTIONS FOR DISCUSSION

The statement is sometimes made to the effect that coal is "condensed sunlight"; is it true, or untrue; and why?

Why are the coal areas of Europe and America also areas of various manufactures?

A recent cartoon had for its title—"John Bull and his coal piles (*i. e.*, coaling stations) rule the world"; show why this statement contains a great deal of truth.

What are some of the advantages of steam-vessels over sailing-vessels?

Whale oil, crude turpentine, kerosene, and gas have been used each in turn for illuminants; what is the advantage of each over the preceding?

Describe the structure of an ordinary kerosene lamp-burner, an argand burner, a Welsbach burner.

For what are aniline, paraffine, naphtha, and carbolic acid used?

FOR STUDY AND REFERENCE

Obtain specimens of anthracite, bituminous, and cannel coal, and coke for comparison and study.

Obtain specimens of crude petroleum, naphtha, refined oil, aniline dye, paraffine, and carbolic acid; note the properties of each. Throw away the naphtha after using.

Read Mineral Resources of the United States on the foregoing subjects.

CHAPTER XIII

METALS OF THE ARTS AND SCIENCES

THE development of modern civilization is directly connected with the mining and manufacture of the useful metals. Their effect on the affairs of mankind can be rightly understood only when they are studied in their relations to one another, as well as to the people who used them. Next to the discovery of the use of fire, an appreciation of the use of metals has been the chief thing to develop the intellect of mankind. When human beings discarded natural caves for artificially constructed dwellings—when they began to cook their food and clothe their bodies, they required tools. These, in the main, consisted of the spears and arrow-heads used as weapons of the chase, and the axes and knives used as constructive tools.

Social
results of
the use of
metals

Necessity
for tools

Rough stone gave place to flint because the latter would take a better edge. For the same reason the people of central Europe sent to the deserts of central Asia for jade wherewith to make axes and knives. Again, for the same reason, jade was discarded, because an alloy of copper and tin produced a bronze that would not only take a sharper edge than stone, but it was hard enough to cut and dress the latter. Egypt rose to a commanding position because of her control of the copper mines in the Sinaitic peninsula, and subsequently of the gold products coming from the upper Nile.

Superiority
of metals
for tools

Political
effect
of the
commerce
of copper

A meridian drawn through Cairo, Egypt, practically divides the world into two kinds of civilization. East of this meridian the population is almost wholly agricultural and,

Difference
of civiliza-
tions due
to use of
metals

World
control
of metal
users

excepting Japan and India, the character of the civilization has changed but little in the past 2,000 years. West of the line the population is essentially characterized as metal-workers. It controls the world—not especially by virtue of a high degree of intellectual development, but because it has availed itself of the properties and characteristics of metals and their applications to commerce.

Four
economic
metals

Results of
discovery
of gold and
silver

Results of
iron and
steel
manu-
facture

The four metals that have had the greatest influence on western civilization are gold, silver, iron, and copper. The discovery of gold and silver has always resulted in a rapid settlement of the regions in which the discoveries were made, and usually in the building of great industrial centres. Thus, the discovery of gold in California was the first step in making the United States a world power. The acquisition of so large an amount of gold caused an industrial expansion that hurried the Civil War, and led to the manufacture of iron and steel both for agricultural machinery and railroad transportation. This, in turn, brought the country so closely in touch with the affairs of China and Japan, that European and American diplomacy in eastern Asia are a common concern. The commercial position of Great Britain is very largely due to her iron mines.

Results of
Bessemer
process

The production of Bessemer steel at a price far less than that of iron at the beginning of the nineteenth century lowered the cost of transporting commodities to the extent that large areas, once of necessity very moderately productive of food-stuffs, are now densely peopled because food-stuffs can be transported to these regions more economically than they can be grown there. Thus, owing to the improvements in iron and steel manufacture, the farmer of Minnesota, the planter of Louisiana, the miner of Colorado, and the factory operative of Massachusetts have each the same comforts of living that are enjoyed by all the



STEEL MANUFACTURE—THE NATIONAL STEEL COMPANY'S SMELTERY AND ROLLING-MILLS, MINGO JUNCTION, OHIO

others, and have them at scarcely more than half the cost of fifty years ago.

Political
results of
the mining
of gold and
silver

The gradual decrease in the production of the silver mines near the present site of Ergasteria proved a beginning of the fall of Athens; and when gold was discovered in the Perim Mountains of Macedonia, the seat of Greek power moved thither. Philip of Macedon hoarded the treasure from the mines of Pangæus, and with the capital thus acquired his son, Alexander the Great, conquered the East, implanted Hellenic business methods there, and drew the various trade routes between Europe and Asia under one control.

Political
results of
the
commerce
of copper

In the fifteenth century copper from the mines near Budapest and silver from the Schwarz Mountains of Germany were the resources that made Germanic Europe pre-eminent. The wresting of the trade in these two metals from Venice caused the rise of Antwerp and brought immense gains to Lübeck, London, Brussels, Augsburg, and Nuremberg. In the latter part of the nineteenth century copper again reached a high position of importance from the fact that upon it largely depends electric motive power and transportation.

Universal
diffusion

Iron.—Iron is one of the most widely diffused of metals. It is abundant in the sun; meteorites contain from more than ten to eighty or ninety per cent. of it; all earths and rocks contain at least traces of it; and in various places the deposits of iron-bearing rock aggregate cubic miles in extent.

Rare
existence
in metallic
form

In only a few localities is iron found in a metallic or "native" form. Many meteorites consist of metallic iron mixed with nickel and manganese, and in Greenland a volcanic dyke or ledge of metallic iron is known to exist. The iron of commerce is derived from "ores," or chemical compounds of iron and oxygen, or iron and carbon. The cheapness of the product depends upon the ease with

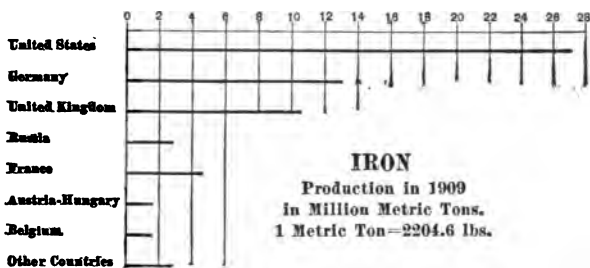
Deriva-
tion from
ores

which the ore may be quarried, transported, and smelted. The following are the ores commonly employed in the production of iron:

Red hematite has a reddish metallic lustre and when pure contains seventy per cent. of iron.* It is the most abundant of the workable ores, and certainly the best for the manufacture of Bessemer steel. The ores of the Lake Superior region are mainly red hematite, and constitute a large part of the output of the United States.

Brown hematite, or limonite, has a chestnut brown color and contains very nearly sixty per cent. of iron*; it in-

Occurrence
and
abundance



THE COMPARATIVE PRODUCTION OF IRON AND STEEL

cludes the "bog" ores, and is very abundant. Not far from one-quarter of the Appalachian ores are brown hematite; it constitutes about one-eighth of the output of the United States.

Occurrence

Magnetic iron ore, or magnetite, of which loadstone, a natural magnet, is an example, has a metallic, steel lustre and contains 72.4 per cent. of iron.* Most of the ores obtained in Pennsylvania and New York are magnetite, but they furnish only a small part of the output of the United States.

Occurrence

Carbonate of Iron, or siderite, occurs in a few localities, the ore produced in Ohio being almost wholly of this kind.

Occurrence

* These percentages are on the supposition that the ores are chemically pure; the percentage of metal actually obtained is somewhat less.

It contains when pure about forty-eight per cent. of iron.* It constitutes less than one per cent. of the output of the United States.

Uses

Iron pyrites, or sulphide of iron, sometimes called "fools' gold," is a very common mineral. It is used in the manufacture of sulphuric acid, but is worthless for the production of iron; indeed, the presence of a very small percentage of sulphur in iron renders the latter worthless for many purposes.

Availa-
bility of
deposits

Extensive deposits of iron are known to exist in very nearly every country in the world, but those which can be advantageously worked are few in number. In order to be available, the deposits must be within easy transporting distance of the people who use it, and likewise of the coal used to manufacture it.

Occurrence
near
centres of
population

For these reasons most of the workable deposits of ore are in or near the great centres of population in western Europe and the eastern part of the United States; as a matter of fact, practically all the iron and steel of the latter country is produced in the populous centres of the Atlantic slopes. In most great steel-making districts it is essential to mix the native ores with special ores brought from a distance, the latter being used to give strength and hardness to the resulting metal. Ores from Sweden, and from Juragua, Cuba, are employed for this purpose in the steel-making establishments of the United States.

Reasons
for
blending
ores

Reasons
for
position of
United
States
in steel
manu-
facture

In the past few years the United States has jumped from an insignificant position in the production of iron and steel to the first rank among the iron-producing countries. This great advance is due to the fortunate geographic position of the iron ore and the coal, and also to the discovery of the Bessemer process of making steel.

* These percentages are on the supposition that the ores are chemically pure; the percentage of metal actually obtained is somewhat less.

In general it is more economical to ship the ore to the coal than *vice versa*. The position of the steel-making plant is largely determined by the cost of moving the coke and ore, together with that of getting the steel to the place of use. Formerly, iron manufacture in the United States was not profitable unless the coal, ore, and limestone* were very near to one another.

Economy
of relative
situation
of ore
and fuel

These conditions still obtain in the southern Appalachian mineral fields; the ore and the coal are at no great distance apart, and a great iron-making industry, in which Birmingham and Bessemer form the principal centre, has grown into existence. For the greater part the coal is coked; and in this form less than a ton† is sufficient to make a ton of pig-iron. The smelteries and rolling-mills are built at places where the materials are most conveniently hauled.

Birmingham
and
Bessemer
as an
illustration

In the past few years the iron and steel industry which formerly centred about the navigable waters at the head of the Ohio River, has undergone a readjustment. Rolling-mills and smelteries exist at Pittsburg and vicinity, and at Youngstown, New Castle, and other near-by localities, but greater steel-making plants have been built along the south shores of Lakes Michigan and Erie, all of which have come about because of reasons that are purely geographic.

Reasons
for location
of
Pittsburg
plants

Immense deposits of excellent hematite ore in the old mountain-ranges near Lake Superior have recently become available. For the greater part the ore is very easily quarried. In many instances it is taken out of the quarry or pit by steam-shovels which dump it into self-discharging

Reasons
for
availability
of
Lake
Superior
ores

* The limestone has no essential part in the smelting of the ore except to produce an easily-flowing, liquid slag; hence it is called a *flux*. Some ores smelt and flow so easily that a flux is not required.

† Under ordinary circumstances about two tons of coal, or three-quarters of a ton of coke, are required to produce a ton of pig-iron.

hopper-cars. Thence the ore is carried on a down grade to the nearest shipping-port on the lake. There it is dumped into huge bunkers built at the docks, and from these it slides down chutes into the holds of the steam-barges. A 6,000-ton barge is loaded in less than two hours; a car is unloaded in a few seconds.



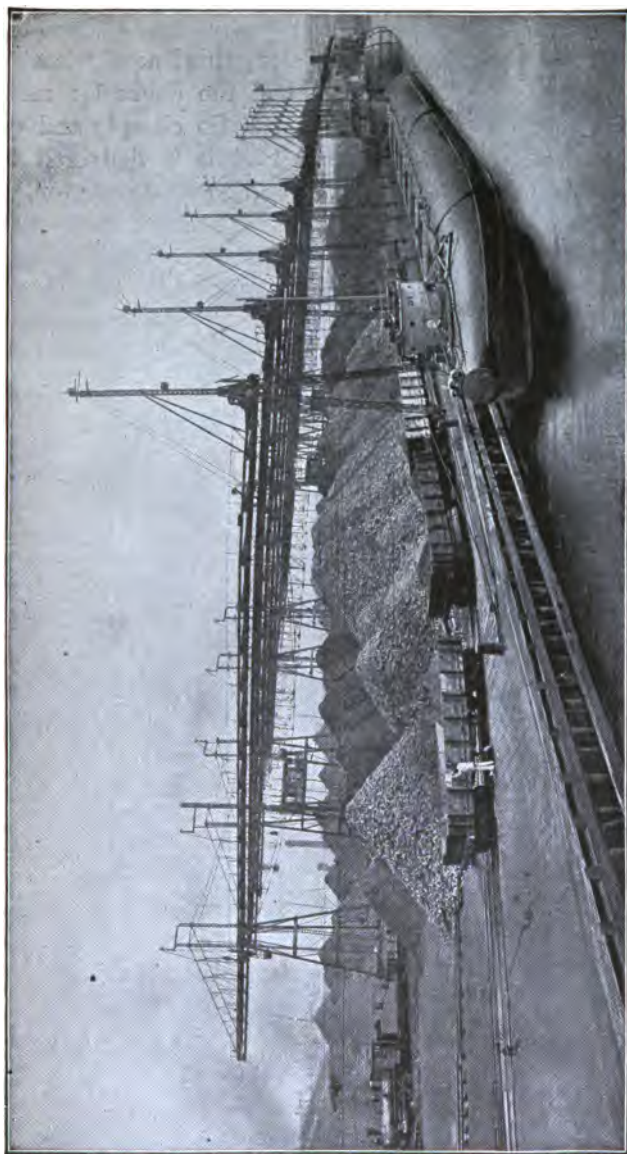
MOVEMENT OF IRON ORE

Water transportation is very cheap compared with railway transportation, even when the road is built and equipped as an ore-hauling road. The ore is therefore carried a distance varying from one thousand to one thousand five hundred miles for less than it could be loaded on cars, hauled one-tenth that distance by rail, and unloaded.

At the south shore of Lake Erie, the ore meets the coke from western Pennsylvania and coal from the Ohio coal-fields, and as a result new centres of iron and steel

Economy
of water
transportation

Reasons
for Lake
Shore
plants



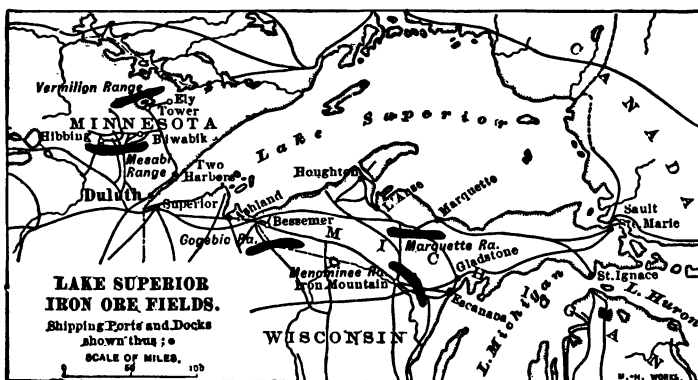
STEEL MANUFACTURE—ORE DOCKS

Economy
of
machine
handling

manufacture have grown up along this line of "least resistance." The ore is unloaded at the docks by means of mechanical scoops and shovels. So cheaply and quickly is it mined and transported that it is delivered to the smelteries at a cost rarely exceeding \$3.25 per ton.

Forms of
iron

There are three forms in which iron is used—cast iron, wrought iron, and steel. Cast iron is crystalline and brittle. The product as it comes from the blast furnace is called pig-iron. In making such commodities as stoves, and articles that do not require great strength, the pig-iron



is again melted and cast into moulds which give them the required shape. Cast iron contains from one to five per cent. of carbon.

Properties
of wrought
iron

Wrought iron is malleable, ductile, and very flexible; when pure it is also very soft. It is prepared by melting pig-iron in furnaces having such a shape that the molten metal can be stirred or "puddled" in contact with the air. By this means the carbon is burnt out, and while still at a white heat the pasty iron is kneaded or "wrought," in order to expel other impurities.

Steel is a form of iron which is thought to contain a

chemical compound of iron with carbon. It is stronger than iron. Formerly, steel was made by heating bars of pure iron with charcoal powder packed in air-tight retorts, or by fusing it in crucibles with charcoal. These methods are still used in the manufacture of steel to be used for cutlery, tools, and machinery.

Properties
of steel

After the beginning of the Civil War, the railways of the United States were taxed beyond their capacity to carry the produce of the country. The locomotives, then weighing about twenty-five tons each, were too light to haul the freight trains; they were too heavy for the rails, which split at the ends and frayed at the edges.

Limita-
tions of
iron in
railway
construc-
tion

The Bessemer process was the result of the demand for a better and cheaper method.* By this process, the iron, or the ore, is put into a "converter" along with certain Swedish or Cuban ores to give the product hardness.

UNITED STATES	Rest of the World
---------------	-------------------

IRON AND STEEL

A hot blast forced into the converter not only melts the mass but burns out the carbon and the slag. The Bessemer process, in turn, has been largely supplanted by "open hearth" furnaces in which, for many ores, the carbon and slag are more easily burnt out. In the southern Appalachian district almost all the product is open-hearth steel.

Method of
steel-
making
by the
Bessemer
process

In 1860, before the establishment of the Bessemer process, steel commanded a price of about one hundred and twenty-five dollars per ton; at the beginning of the twentieth century Bessemer billets were about eighteen dollars per ton. In western Europe and the United States there are used about three hundred pounds of iron and steel per

Economy
of the
Bessemer
process

* Theoretically, Bessemer steel is not steel at all, but a form of wrought iron *free from slag*. Chiefly because of its freedom from slag, it is much stronger and harder than ordinary wrought iron. For that reason, the first makers of it named it Bessemer "steel."

Consumption of steel per capita

capita; in South America the rate of consumption is about fifteen pounds; in Asia (Japan excepted) it is probably less than three pounds.

Results of low priced steel

The economic results of low-priced steel are very far-reaching. Steam boilers of steel carry a pressure of more than two hundred and fifty pounds to each square inch of surface—about four times as great as in the iron boilers formerly used. Locomotives of eighty tons draw the fast passenger trains at a speed of sixty miles an hour. Ponderous compounding engines weighing one hundred and twenty tons haul ninety or more steel freight cars that carry each a load of 100,000 pounds. The iron rails formerly in use weighed about forty pounds per yard; now steel rails of one hundred pounds per yard are employed on most trunk lines.

Advantages of steel in office buildings

In the large commercial buildings steel girders have entirely supplanted timber, while in nearly all modern buildings of more than six stories in height, the frame is constructed of Bessemer steel. Indeed, a steel-framed building of twenty-five stories has greater stability than a brick or stone building of six. Such a structure as the "Flatiron Building" in New York or the Masonic Temple in Chicago would have been impossible without cheap steel.

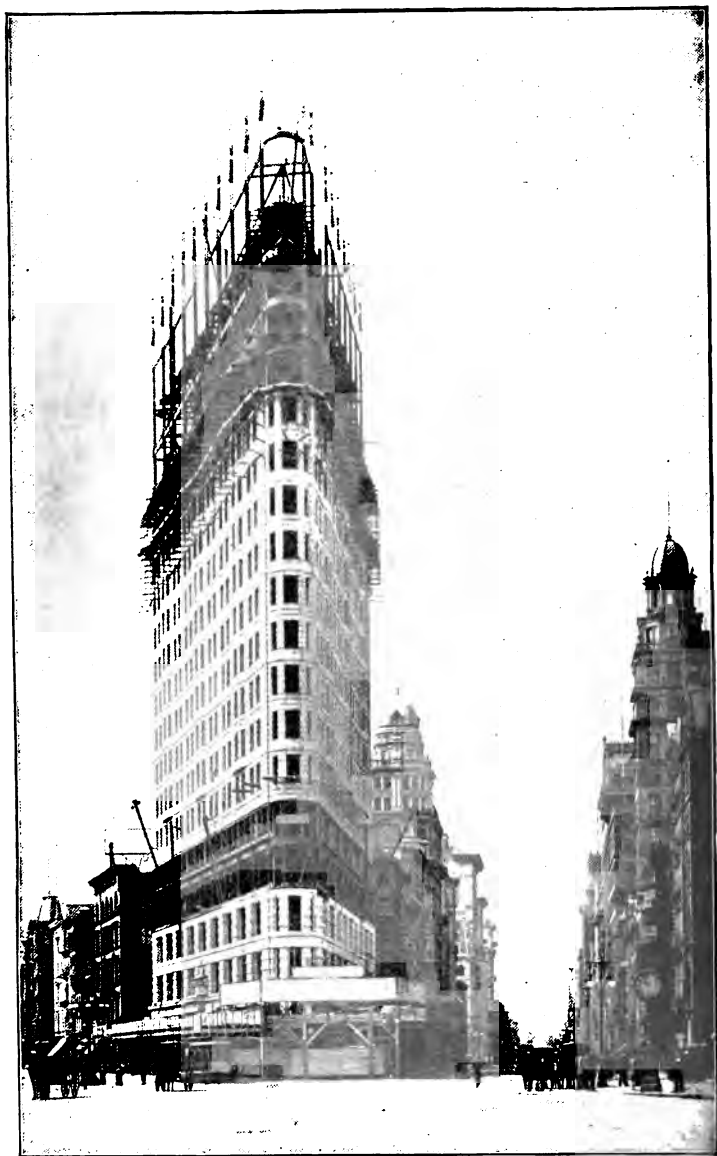
Results of cheap steel in ocean commerce

In ocean commerce cheap steel has worked even a greater revolution. In 1860, a vessel of 4,000 tons displacement was thought to be almost up to the limit. The Olympic of the White Star Line has a displacement of about forty-five thousand tons. This is nearly equalled by the measurement of half a dozen other liners, most of which have been recently built for freight-carrying rather than for fast passenger service.

HISTORICAL

1619.—Iron works established on Falling Creek, Va.

1643.—First foundry in Massachusetts, at Lynn.



From a copyrighted photograph by C. L. Ritzmann, N. Y.

**THE FULLER (FLATIRON) BUILDING, NEW YORK CITY,
SHOWING THE FRAME OF STEEL**

- 1658.—Blast furnace and forge at New Haven, Conn.
1679.—Father Hennepin discovers coal in Illinois.
1703.—Mordecai Lincoln, ancestor of Abraham Lincoln, establishes iron works at Scituate, Mass.
1717.—First bar iron exported from American Colonies to West Indies.
1728.—Steel made, Hebron, Ct.
1732.—Father of George Washington establishes furnace in Virginia.
1740.—First iron works in New York, near Hudson.
1750.—Bituminous coal mined in Virginia.
1766.—Anthracite coal discovered in Pennsylvania.
1770.—First rolling-mill in Colonies, Boonton, N. J.
1801-1803.—Lake Champlain iron district, New York, developed.
1812.—First rolling-mill at Pittsburg.
1828.—Baltimore & Ohio Railroad, first steam railway in the United States, begun.
1829.—“Stourbridge Lion,” first locomotive in America, used in Delaware & Hudson Railway.
1830.—The T rail invented by Robert L. Stevens.
1830.—First American locomotive, “Tom Thumb,” built by Peter Cooper at Baltimore.
1830.—Twenty-three miles of railway in the United States.
1844.—Lake Superior iron ores discovered by William Burt.
1850.—First shipment of Lake Superior ore, ten tons.
1857.—Iron industry founded in Chicago.
1862.—Phoenix wrought iron column, or girder, first made.
1864.—Bessemer steel first made in the United States.
1865.—First Bessemer steel rails in the United States rolled at Chicago.
1890.—First armor-plate made in the United States rolled at Bethlehem, Pa.
1890.—The United States surpasses Great Britain in production of pig-iron.
1900.—The United States leads in the production of open-hearth steel.

Gold.—Gold is one of the metals earliest to be mined. It is mentioned by the ancient profane as well as by sacred writers. Pictorial representations of fusing and work-



GOLD MINING—STOPPING OUT
A TUNNEL

ing the metal are sculptured on early Egyptian tombs, and beautiful gold ornaments have been found that were made by the prehistoric peoples who once occupied ancient Etruria, in Italy. Columbus found gold ornaments in the possession of the aborigines. The Incas of Peru and the Aztecs of Mexico possessed large quantities of gold.

History
and
antiquity

Gold is one of the most widely diffused of metals. Traces of it are found in practically all igneous and in most sedimentary rocks. It occurs in sea-water, and quite frequently in beach-sands. Traces of it are also found in alluvial deposits and in most rock waste. In spite of its wide diffusion, however, all the gold that has been mined could be stored in the vaults of a large bank.

Wide
diffusion

In all probability most of the gold now in use has been deposited by solution in quartz veins, the latter usually filling seams and crevices in granitic or vol-

How
deposited

**Method of
extraction**

canic rocks. Quartz veins seldom yield very great returns, but they furnish a steady supply of the metal. The rock must be mined, hoisted to the surface, and crushed. The gold is then dissolved by quicksilver (forming an amalgam from which the quicksilver is removed by heat), by potassium cyanide solution, or by chlorine solution.

**Placer
deposits**

In many instances the quartz veins have been broken and weathered by natural forces. In such cases the gold is usually carried off by swiftly running water and deposited in the channel lower down. In this way "placer" deposits of gold occur. Placer deposits are sometimes very rich, but they are quickly exhausted. The first gold discovered in California was placer gold. Nearly all the gold mined in the United States has come from the western highlands in 1912, Colorado, California, South Dakota (Black Hills), Nevada, and Alaska yielded about four-fifths of the

**California
mines****Rocky
Mountain
mines****Alaskan
mines****Annual
yield of
United
States****Rich gold
regions**

entire product. The placer mines of Alaska are confined mainly to the beach-sands and the tributaries of the Yukon River. From 1849 to 1890 the average annual yield of gold in the United States was about forty-three million dollars.

The Guinea coast of Africa, Australia, California, the Transvaal of South Africa, and Venezuela have each stood at the front in the production of gold. The aggregate annual production of the world has increased from one



**LEACHING (CYANIDE) TANKS
DISSOLVING THE GOLD FROM
THE ROASTED ORE**

hundred and sixty million dollars in 1853 to nearly four hundred and eighty million dollars in 1910. World's production

A considerable part of the gold product is used in gilding picture-frames, book-titles, sign-letters, porcelain, and ornamental brass work. Practically, all of this is lost, and in the United States alone the loss aggregates about fifteen million dollars yearly. Used and lost

The abrasion and unavoidable wear of gold coin is another great source of loss.

A considerable amount is used in the manufacture of jewelry, most of which is used over and over again. By far the greater part, however, is used as a commercial medium of exchange—that is, as coin. Used but not lost

For this purpose its employment is wellnigh universal; and indeed this has been its chief use since the beginning of written history. Gold coin of the United States is 900 fine, Coin and its fineness



GOLD MINING—INTERIOR OF MILL

that is, 900 parts of every thousand is pure gold; gold coin of Great Britain is 916 $\frac{2}{3}$ fine. In each case a small amount of silver, or silver and copper, is added to give the coin the requisite hardness. The coining of gold, and also other metals, is a government monopoly in every civilized country.

The fiat value of gold throughout the commercial world is the equivalent of \$20.6718 per troy ounce of fine metal; Fiat value of gold

an eagle weighs, therefore, 258 grains. The real value,

Real value however, is reckoned by a different and a more accurate standard—namely, the labor of man.

Over-production of gold and its results It is estimated, however, that the gold product of the United States has paid an average of less than one dollar a day per man. More gold has been produced than is required for commercial purposes and, as a result, its purchasing power has been lowered; that is, gold production has increased faster than business. Another result is also noticeable; long-time railroad bonds, which are redeemable in a metal of uncertain value, are not so marketable as short-time notes redeemable in currency.

Diffusion **Silver.**—Silver is about as widely diffused as is gold, but it is more plentiful. It is found sparingly in most of the older rocks and also in sea-water. It was used by the Greeks for coinage more than eight hundred years before the Christian era, and was known to the Jewish people in very early times. According to the writer of the Book of Kings (1 Kings x. 21), "It was nothing accounted of in the days of Solomon," but Tacitus declares that in ancient Germany silver was even more valuable than gold.

Changing value The mines of Laureion gave the Greek state of Attica its chief power, and the failure of the mines marked the beginning of Athenian decline.

Political results of mines in Attica

Silver-bearing minerals Silver is rarely found in a metallic state. For the greater part it occurs combined with chlorine ("horn silver"), or with sulphur ("silver glance"), or in combination with antimony and sulphur ("ruby ore"). The ranges of the western highland region of the American continent yield most of the present supply. The mines of Colorado, Montana, Utah, and Idaho produce about six-sevenths of the yield in the United States, which in 1912

Occurrence in United States was 63,000,000 ounces. In Europe, the Hartz Mountains

Occurrence in Europe have been one of the principal sources of silver for several centuries.

About four-fifths of the silver bullion is used in the arts, most of it being manufactured into ornaments or into table-service called "plate." A considerable amount is used in photography, certain silver salts, especially the chloride and the bromide, changing color by exposure to the light. The remaining part of the silver output is made into coin.

Uses

The ratio of silver and gold has fluctuated much in the history of civilization. In the United States the coin value of an ounce of silver is fixed at \$1.2929, thereby making the ratio 16 to 1. The silver dollars, 900 fine, were coined on this basis, weighing 412.5 grains. With the tremendous output of the silver mines between 1870 and 1880 the price of silver fell to such an extent that, in time, most countries limited the amount of coinage or demonetized it altogether. In the United States the purchase of silver bullion for coinage has been practically suspended, and the silver purchased is bought at the bullion value—in 1914, about fifty-five cents per troy ounce. In Japan the ratio for coinage has been officially fixed at 32 to 1.

Ratio of
silver and
gold
valuesRatio in
Japan

Copper.—Copper is probably the oldest metal known that has been used in making tools. An alloy of copper and tin, hard enough to cut and dress stone, succeeded the use of flint and jade, and its employment became so general as to give the name "bronze" to the age following that characterized by the use of stone implements.

Antiquity
of copper

Copper is very widely distributed. It occurs in quantities that pay for mining in pretty nearly every country in the world. The rise of Egypt as a commercial power was due to the fact that the Egyptians controlled the world's trade in that metal, and it is highly probable that the conquests of Cyprus at various times were chiefly for the possession of the copper mines of Mount Olympus.

Distribu-
tion

At the present time there are several great centres of

Regions of
production

production which yield most of the metal used. These are the Rocky Mountain region, including Mexico ; the Lake Superior region of the United States ; the Andean region, including Chile, Peru, Argentina, and Bolivia ; the Iberian region, consisting of Spain and Portugal ; and the Hartz Mountain region of Germany. In 1900 they produced about eight hundred fifty thousand tons, of which five hundred thousand were mined in the United States. Japan has recently become a copper-producing country.

Production
in United
States

Montana, the Lake Superior mines, and Arizona are the most productive regions of the United States, and the mines of these three localities yield about half the world's product. Of these mines the Calumet and Hecla of the Lake Superior region is the most famous. It was discovered by Jesuit explorers about 1660, but was not worked until 1845. It is one of the most productive mines in the world.

Export
trade

The export trade in copper is very important, amounting at the close of the past century to about one hundred and seventy thousand short tons. Of this amount half goes to Germany (most of it through ports of the Netherlands), and one-fifth each to France and Great Britain. The market price to the consumer during the ten years closing the century average about sixteen cents per pound. Most of the product is exported from New York and Baltimore. The head-quarters of the great copper-mining companies of America are at Boston. The imports of raw ores and partly reduced ores, called "regulus," come mainly from Mexico to New York and Baltimore, and from Mexico and Japan to Puget Sound ports. The most important American refineries are at New York and Baltimore.

Import
trade

Refineries

Uses

A part of the copper is mixed with zinc to form brass, an alloy much used in light machinery. A considerable quantity is rolled into sheets to sheath building fronts and

the iron hulls of vessels. By far the greater part, however, is drawn into wire for carrying electricity, and for this purpose it is inferior to silver alone. The decrease in the price of copper in the past few years is due, not to a falling off in the demand, but to methods of reducing the ores and transporting the product more economically.

Reasons
for
decreased
price

Aluminium.—Aluminium is the base of clay, this mineral being its oxide. It occurs in the various feldspars and feldspathic rocks, and in mica. The expense of extracting the metal from these minerals has been so great as to prohibit its commercial use. In 1870 there were probably less than twenty pounds of the metal in existence, and it was to be found only as a curiosity in the chemical laboratories. The discovery that the metal could be extracted cheaply from cryolite, a mineral with an aluminium base, obtained from Ivigtut, Greenland, led to a sparing use of the metal in the economic arts.

Occurrence

First use

The chief step in the production of the metal dates from the time that the mineral *bauxite*, a hydroxide of aluminium and iron, was decomposed in the electric furnace. The process has been repeatedly improved and, under the patents covered by the Hall process, the crude metal is now produced at a market price of about eighteen cents per pound. The entire production of the United States is controlled by the Pittsburg Reduction Company, which also manufactures much of the commercial product of England. The chief competitor of the Pittsburg Reduction Company is an establishment in Germany, near Bremen.

Manu-
facture

Aluminium does not corrode; it is easily rolled, drawn, or cast; and, bulk for bulk, it is less than one-third as heavy as copper. Because of these properties it has a great and constantly growing economic value. Because of its greater size, a pound of aluminium wire will carry a greater electric current than a pound of copper wire of

Properties

the same length. It therefore has an increasing use as a conductor of electricity.

Occurrence
of bauxite

Bauxite, the mineral from which the metal is now chiefly extracted, is obtained in two localities in the United States. One extends through Georgia and Alabama; the other is in Arkansas.

Occurrence

Lead.—Lead is neither so abundant nor so widely diffused as iron, copper, and the precious metals, but the supply is fully equal to the demand. Lead ores, mainly *galena* or lead sulphide, occur abundantly in the Rocky Mountains; Colorado, Idaho, and Utah produce more than half the total output of the United States. In these localities, in Mexico, and in the Andean States of South America it is used mainly in the smelting of silver ores.

Uses in
metallic
form

Metallic lead is used largely in the manufacture of water-pipes, and for this purpose it must be very nearly pure. It is also rolled into sheets to be used as lining for water-tanks. The fact that the edges of sheet-lead and the ends of pipes may be readily joined with solder gives to lead a great part of its economic value. Alloyed with arsenic it is used in making shot; alloyed with antimony it forms type metal; alloyed with tin it forms pewter and solder.

Chemical
prepara-
tions

The greater part, however, is manufactured into the carbonate or "white" lead that is used as a pigment, or paint. Red lead, an oxide, is a pigment; litharge, also an oxide, is used for glazing the cheaper kinds of pottery. About two hundred and thirty thousand tons of lead are produced in the United States and one-half as much is imported—mainly from Mexico and Canada. The linotype machines, now used in all large printing establishments, have increased the demand for lead.

Alloys

Other Metals.—Most of the remaining economic metals occur in small quantities as compared with iron, copper, gold, and silver. Some of them, however, are highly

important from the fact that in various industrial processes no substitutes for them are known.

Quicksilver, or mercury, is the only industrial metal that at ordinary temperatures is a liquid. It is the base of the substance calomel, a chloride, and corrosive sublimate, a dichloride, both of which are employed as medicines. It is essential in the manufacture of thermometers and barometers, but is used chiefly, however, as a solvent of gold, which it separates from the finely powdered ore by a form of solution known in the arts as "amalgamation." Quicksilver occurs in the mineral *cinnabar*, a sulphide of the metal.

Uses

Occurrence

Nearly one-half the world's product comes from California. The production of the United States in 1912 was twenty-five thousand flasks, the metal being sent to the consumers in iron flasks, averaging seventy-five pounds each of quicksilver. The New Almaden mines of California produce most of the metal. Almaden, Spain, and Idria, Austria, produce nearly all the rest of the output. About fifteen thousand flasks are exported yearly from San Francisco. These go mainly to the mines of Mexico, Central America, and South America.

Production in United States

Production in Europe markets

Tin is about the only metal of industrial value whose ores are not found in paying quantities in the United States. Small quantities occur in San Bernardino County, Cal., but it is doubtful if the ore will ever pay for development. About three-fifths of the world's product comes from the Straits Settlements on the Malay Peninsula; the near-by islands of Banca and Billiton also yield a large part; Bolivia also yields a considerable quantity.

Occurrence

The mines of Cornwall, England, have been worked for two thousand years and were probably the source of the tin that made the "bronze age." The United States imports yearly about twenty million dollars' worth

Cornish mines

Uses of tin, about half of which comes from the Straits Settlements. This is used almost wholly for the manufacture of tin plate*—that is, sheet-iron coated with tin. Much of the block tin imported from Great Britain is returned there in the form of tin plate, being manufactured in the United States much more economically than in Europe.

Economy of manufacture in United States

Occurrence **Nickel** occurs in New Caledonia, in Canada, and in the State of Missouri. It is used in the manufacture of small coins and for plating iron and steel. It is an essential in the metal known as "nickel steel" which is now generally used in armor-plate and propeller-shafts, about four per cent. of nickel being added to the steel. Most of the product used in the United States is imported from Canada.

Uses

Occurrence **Manganese**, a metal resembling iron, occurs in Russia, Brazil, and Cuba, Russia producing about half the total output. It is used mainly to give hardness to steel. The propeller-blades of large steamships are usually made of manganese bronze. The building of war-ships in the United States during the past few years has led to the extensive use of manganese for armor-plate. Technically, manganese steel is a composition containing not less than seven per cent. of manganese. With a materially smaller proportion the alloy is so brittle as to be worthless.

Uses

Occurrence **Zinc** is abundant in nearly every part of the world. In the United States the best known mines are in the Galena-Joplin District, in Missouri and Kansas, which produce about two-thirds of the home product—mainly from the ore *blende*, a sulphide. There are also extensive zinc-mining operations in Illinois, New Jersey, and Pennsylvania. The lower Rhine District, Great Britain, and Silesia are the chief European sources. Sheet-zinc is found in nearly every dwelling in the United States, and zinc-coated

* *Terne* plate is sheet-iron coated with an alloy of lead and tin.

or "galvanized" iron has become a domestic necessity. Zinc-white is extensively used as a pigment. About two hundred and fifty million pounds of crude zinc, or "spelter," are produced in the United States. Uses

QUESTIONS FOR DISCUSSION

What qualities make iron the most valuable metal ?

In what ways does commerce depend on iron and steel ?

What substances are used for food, clothing, or domestic purposes that are not manufactured by the aid of iron ?

Ingot or billet steel is rated at about one cent per pound ; the hair-springs of watches are worth several thousand dollars per pound ; what makes the difference in their value ?

What are the qualities that give to gold its value ?

What causes have led to the increasing price of copper during the past few years ?

FOR STUDY AND REFERENCE

Obtain specimens of the following iron ores : Hematite, brown hematite, magnetite, carbonate, and pyrites. Note the color and physical appearance of each ; scratch the first four with a very hard steel point and note the color of the streak.

Obtain specimens of the following copper ores : Malachite, azurite, chalcopyrite, and red oxide ; wet a very small fragment with an acid and note the color when it is held in the flame of an alcohol lamp or a Bunsen burner ; dissolve a crystal of blue vitriol (copper sulphate) in water and note what occurs if the end of a bright iron wire be dipped in the solution.

CHAPTER XIV

SUGAR AND ITS COMMERCE

Applica-
tion of
name

THE term sugar is applied rather loosely to a large number of substances characterized by the quality of sweetness. In a few instances the name is given to certain mineral salts, such as sugar of lead, but in the main the sugars are plant products very similar in chemical structure to the starches. They are very closely connected with



SUGAR-REFINERY, BROOKLYN, N. Y.

Derivation
from
starch

plant growth, and even in animal life, starchy substances are changed to sugar in the process of digestion. Although sugar does not sustain life, it is necessary as an adjunct to other food-stuffs, and it is probably consumed by a greater number of people than any other food-stuffs except starch and water.

Kinds of
sugar

Three kinds of sugar are found in commerce, namely—*cane-sugar*, *grape-sugar*, and *milk-sugar*. Cane-sugar occurs

in the sap of the sugar-cane, sorghum-cane, certain of the palms, and the juice of the beet. Grape-sugar is the sweet principle of most fruits and of honey. Sugar of milk occurs in milk, and in several kinds of nuts.

Occurrence

Sugar-Cane Sugar.—Cane-sugar is so called because until recently it was derived almost wholly from the sap of the sugar-cane (*Saccharum officinarum*). The plant belongs to the grass family and much resembles maize before the latter has matured. It is thought to be native to Asia, but it is now cultivated in nearly all tropical countries in the world.

Origin



SUGAR-CANE GROWING IN CUBA

Practically every moist tropical region in the world, the basins of the Kongo and the Amazon Rivers excepted, is a cane-sugar-producing region. It is grown in the states under native rule chiefly for home consumption, but in European colonies for commercial purposes. India and China are foremost in the production of cane-sugar, but the product is not exported. Tropical America, Cuba, Java, Mauritius, the Philippine, and the Hawaiian Islands produce the most of the supply.

Regions of production

Beet-Sugar.—In past years the demands for sugar increased so greatly that it became necessary either to raise the price, or else to utilize some plant other than the

Effects of over-consumption

sugar-cane as a source. A few years of experiment showed that sugar could be obtained from the juice of the common beet (*Beta vulgaris*). Several varieties of this plant are cultivated for the purpose. Beet-sugar and cane-sugar are identical.

Regions of
production

Most of the beet-sugar of commerce comes from Europe; Germany produces about one-third; France, Austria, and Russia follow, each producing about one-sixth. A small amount is produced in the United States—mainly in Colorado, California, and Michigan. The area of production is increasing.



TRANSPORTING SUGAR-CANE, CUBA

Maple-
sugar

Other Cane-Sugars.—Maple-sugar is derived from the sap of several species of maple-trees occurring in the United States and in Canada. The sap is obtained by tapping the trees in spring, a single tree often yielding several gallons. It is used partly as a confection, but in the main as a sirup.

Sorghum-
sugar

Sorghum-sugar is obtained from a cane known as Chinese grass, or Chinese millet. It has been introduced into the United States from China and Japan. The cultivation of sorghum-cane in the Mississippi Valley States has been successful. The sugar is not easily crystallizable, and it is usually made into table-sirup.

Magney-sugar is derived from the sap of the Magney-plant (*Agave Americana*). It is much used in Mexico and the Central American states. The product is not exported. Palm-sugar is obtained from the sap of several species of palm growing in India and Africa.

Other
sugars

Sugar Manufacture.—Sugar manufacture includes three processes—expressing the sap, evaporating, and refining. The first two are carried on at or near the plantations; the last requires a large capital and an elaborately organized plant. It is done mainly in the great cities at places convenient for transportation. The raw sugar may travel ten thousand miles to reach the refinery; the refined product rarely travels a thousand miles.

Economy
of manu-
facture

After it has been cut and stripped of its leaves the cane is crushed between rollers in order to express the juice. The sugar-beet is reduced to a pulp from which the juice is expressed. The juice contains about ten per cent. of sugar. In some factories the beet, or the cane, is cut into thin slices and thrown into the water, which extracts the juice. This is known as the “diffusion” process.

Expression
of juice

The juice is first strained or filtered under pressure in order to remove all foreign matter and similar impurities. It is then clarified by adding slacked lime, at the same time heating the liquid nearly to the boiling point and skimming off the impurities that rise to the surface. The purified juice is then boiled rapidly in vacuum pans until it is greatly concentrated.

Clarifica-
tion

When the proper degree of concentration is reached, the liquid is quickly run off into shallow pans, in which most of it immediately crystallizes. The crystalline portion forms the *raw sugar* of commerce; the remaining part is molasses. The whole mass is then shovelled into a centrifugal machine which in a few minutes separates the two products.

Crystal-
lization

In purchasing raw sugar, the refiner was formerly at a loss to know just how much pure sugar could be made from a given weight of the raw sugar. In order to aid in making a correct determination, the Dutch government formerly prepared sixteen samples put up in glass flasks and sealed. These samples varied in color according to the amount of pure sugar contained. The pure solution was known in commerce as No. 16 Dutch Standard, and this was generally taken all over the world as the standard of pure sugar. Within recent years the polariscope, an optical instrument that determines the percentage of sugar by means of polarized light, has largely replaced the Dutch Standard tests.

The refineries, as a rule, are built with reference to a minimum handling and transportation of the raw product. The cane-sugar refineries are mainly at the great seaports, where the raw sugar does not pay railway transportation. The beet-sugar refineries are in the midst of the beet-growing districts. So nearly perfect and economically managed are these processes, that raw sugar imported from Europe or from the West Indies, at a cost of from two and a quarter to two and a half cents per pound, is refined and sold at retail at about five cents.

The margin of profit is so very close, however, that in the United States, as well as most European states, the sugar industry is protected by government enactments. In the United States imported raw sugar pays a tariff in order to protect the cane-sugar industry of the Gulf coast and the beet-sugar grower of the Western States. In 1910, the duty on raw sugar was about $1\frac{1}{2}$ cents per pound; or, if the sugar came from a foreign country paying a bounty on sugar exported, an additional countervailing duty equal to the bounty was also charged.

In the various states of western Europe the beet-sugar

Dutch
standards
of test

Polari-
scope test

Economy
of
refineries

Low cost

Sugar
tariff

Counter-
vailing
duty

industry is governed by a cartel or agreement among the states, which makes the whole business a gigantic combination arrayed against the tropical sugar interests. In general, the government of each state pays a bounty on every pound of beet-sugar exported. The real effect of the export bounty is about the same as the imposition of a tax on the sugar purchased for consumption at home.

Beet-sugar
cartel

Bonus on
export
sugar

About one-half the entire sugar product is made from the beet, at an average cost of about $2\frac{1}{2}$ cents a pound. In the tropical islands the yield of cane-sugar per acre is about double that of beet-sugar and it is produced for about five dollars less per ton. The difference is in part offset by the fact that the raw cane-sugar must pay transportation for a long distance to the place of consumption, and in part by the government bounties paid on the beet product.

Cost of
beet-sugar

Both the political and the economic effects of beet sugar-making have been far-reaching. In Germany the agricultural interests of the country have been completely re-organized. The uncertain profits of cereal food-stuffs have given place to the sure profits of beet-sugar cultivation, with the result that the income of the Germans has been enormously increased. In the other lowland countries of western Europe the venture has been equally successful. Even the Netherlands has profited by it.

Political
results of
beet-sugar
protection
in
Germany

In the case of Spain, the result of beet-sugar cultivation was disastrous. The price of cane-sugar in Cuba and the Philippine Islands fell to such a low point that the islands could not pay the taxes imposed by the mother country. Instead of lowering the taxes and adjusting affairs to the changed conditions, the Spaniards drove the islands into rebellion, and the latter finally resulted in war with the United States, and the loss of the colonies. Great Britain wisely adjusted her colonial affairs to the changed con-

Results of
sugar
protection
in Cuba
and British
West
Indies

ditions, but the British colonies suffered greatly from beet-sugar competition.

Enormous
increase
of con-
sumption

Production and Consumption.—The production and consumption of sugar increased about sevenfold during the latter half of the nineteenth century, the increase being due very largely to the decreased price. Thus, in 1850, white or "loaf" sugar was a luxury, retailing at about twenty cents per pound; in 1870 the wholesale price of pure granulated sugar was fourteen cents; in 1910, it was about five cents.

Lowering
of price

Handicap
of tropical
countries

Although the tropical countries are greatly handicapped by the political legislation of the European states, they cannot supply the amount of sugar required, unless the area of production be greatly extended. It is also certain that without government protection, sugar growing in the temperate zone cannot compete successfully with that of the tropical countries.

Protection
in
temperate
zone

Consump-
tion per
capita

About fifteen million tons of sugar are consumed yearly. The annual consumption per capita is about ninety pounds in Great Britain, eighty pounds in the United States, and not far from forty-two pounds in Germany and France. In Russia and the eastern European countries it is less than twenty pounds.

Properties
and uses of
molasses

Molasses.—The molasses of commerce is the uncrystallizable sugar that is left in the vacuum pans at the close of the process of evaporation. The molasses formerly known as "sugar house" is a filthy product that nowadays is scarcely used, except in the manufacture of rum. The color of molasses is due mainly to the presence of "caramel" or half-charred sugar; it cannot be wholly removed by any ordinary clarifying process.

Sirup

Purified molasses is usually known as "sirup," and much of it is made by boiling a solution of raw sugar to the proper degree of concentration. A considerable part is

made from the sap of the sorghum-cane, and probably a larger quantity consists of glucose solution colored with caramel. The maple-sirup of commerce is very commonly made from raw cane-sugar clarified and artificially flavored. The pure-food law now requires it to be properly marked.

Maple-sirup

Glucose.—Glucose, or grape-sugar, is the natural sugar of the grape and most small fruits. Honey is a nearly pure, concentrated solution of glucose. Grape-sugar has, roughly, about three-fifths the sweetening power of cane-sugar. Natural grape-sugar is too expensive for ordinary commercial use; the commercial product, on the other hand, is artificial, and is made mainly from corn-starch.

Occurrence

Manu-
facture

Glucose is employed in the cheaper kinds of confectionery in the United States; most of it, however, is exported to Great Britain, the annual product being worth about four million dollars. From the fact that it can be made more economically from corn than from any other grain, practically all the glucose is made in the United States.

Uses

QUESTIONS FOR DISCUSSION

It frequently happens that the prices of sugar and tin-plate rise and fall together; show how the fruit-crop may cause this fluctuation.

Which of the possessions of the United States are adaptable for cane-sugar?—for beet-sugar?

In what ways has the manufacture of sugar brought about international complications?

What is meant by "Dutch Standard" tests?—by polariscope tests?

FOR REFERENCE AND STUDY

Obtain specimens of rock candy, granulated sugar, raw sugar, and caramel; observe each carefully with a magnifying glass and note the difference.

World's Sugar Production.

CHAPTER XV

FORESTS AND FOREST PRODUCTS

Uses of
wood

OUTSIDE the food-stuffs, probably no other material is more generally used by human beings than the products of the forests. More people are sheltered by wooden dwellings than by those of brick or stone, and more people are warmed by wood fires than by coal. Even in steam-making a considerable power is still produced by the use of wood for fuel.

No
substitute
for lumber

Neither stone nor metal can wholly take the place of wood as a building material; indeed, for interior fittings, finishings, and furniture, no artificial substitute has yet been found that is acceptable. For such purposes it is carried to the interior of continents and transported across the oceans; and although the cost has enormously increased, the demand has scarcely fallen off.

Zone of or-
namental
woods

Forest Areas.—The great belts of forests girdle the land surface of the earth. A zone of tropical forest forms a broad belt on each side of the equator, but mainly north of it. This forest includes most of the ornamental woods, such as mahogany, ebony, rosewood, sandal-wood, etc. It also includes the most useful teak as well as the rubber-tree and the cinchona. Another forest belt in the north temperate zone is situated mainly between the thirty-fifth and fiftieth parallels. It traverses middle and northern Europe and the northern United States.

Zone of
pines and
building
timber

This forest contains the various species of pine, cedar, and other conifers, the oaks, maples, elms, birches, etc.

Most of the forests of western Europe have been greatly depleted, though those of Norway and Sweden are still productive. The forests of the United States, extending from Maine to Dakota, have been wellnigh exhausted. Only a very little good lumber-making timber remains. Much of the younger timber is inferior for lumber.

Depletion
of forests

Of the five hundred million acres of the forest-covered land in the United States, about one-fifth is a part either of State or national domain. The rest is owned chiefly by the Southern Pacific and Northern Pacific railways and by large lumber companies. The rate of timber-cutting is three times that of annual growth. The lumbermen take the best trees for building-lumber. The railways follow the lumbermen, cutting out everything suitable for ties. The paper-makers vie with the tie-cutters, and what is left is the plunder of the charcoal-burner.

Ownership
of forests
of United
States

Over-con-
sumption
of lumber

Forestry.—In most of Europe the care of the forests is a government charge. Only a certain number of trees may be removed each year, and many are planted for each one removed. In the United States, where the value of the growing timber destroyed by fire each year nearly equals the national debt, the Federal Government, through its Forest Service, is beginning to prevent unnecessary destruction and to reforest the denuded areas. Many of the States encourage tree-planting. In several, Arbor Day is a legal holiday.

Needs of
forest
service

Arbor Day

The Federal Government has established timber preserves in several localities in the West. The State of New York has converted the Adirondack region into a preserve. Forest wardens and guards are employed both to keep fires in check and to prevent the ravages of timber thieves; excepting the State preserves, however, the means of prevention are inadequate for either purpose.

Federal
and State
timber
preserves

To be valuable for lumber of the best quality, a forest



THE LUMBER INDUSTRY—A LOG JAM

tree must be "clear"; that is, it must be free from knots at least fifteen feet from the ground. In the case of pines and cedars, the clear part of the trunk must have a greater length. To produce such conditions, the trees must grow thickly together, in order that the lower branches may not mature.

Conditions
necessary
for
merchant-
able
lumber

The growth of trees thus set is very slow. Isolated pine-trees will reach the size large enough for cutting in about forty years, but the lumber will be very poor because of the knots.* On the other hand, pine forests with the trees so thickly set as to make a clear, merchantable lumber require nearly a century for maturity. Oak forests require a much greater period.

Slowness
of growth

As a rule, the forest growths of the United States are found in the areas characterized by sandy and gravelly soils. Thus, the glaciated region of the United States and Canada for the greater part is forest-covered. The sand barrens along the Atlantic coast usually are forest areas. The older bottom-lands of most rivers are often forest-covered, especially when their soil is coarse and sandy.

Influence
of soil

There are large areas, however, in both the United States and Europe, that are treeless. In some instances this condition, without doubt, resulted from the fires that annually burnt the grass. With the cessation of the prairie fires, forest growths have steadily increased.

Fires a
cause of
treeless
areas

In other instances these areas are treeless because the seeds of trees have never found lodgment there. The high plains at the eastern base of the Rocky Mountains are an example. This region is deficient in the moisture required to give young trees the vigorous start that will carry them to maturity. Moreover, the westerly winds and the streams of this region come from localities also

Other
reasons for
treeless
areas

* Heredity is likewise a factor. The seeds of knotty, scraggly trees are very apt to produce trees of their own kind and *vice versa*.

deficient in forests, and there are therefore no seeds to be carried.

Effects of
winds,
floods, and
ocean
currents in
distribu-
tion of
forests

As a rule, the distribution of forests is effected by the winds and by moving water. The prevailing westerly winds of the temperate zones have carried many species eastward and have extended the forest areas in that direction. Freshets, floods, and overflows have been even more active in carrying seeds, sprouts, and even trees into new territories. Waves and currents have likewise played a similar part. Wherever the soil of the region into which the species have been carried is moist and nutritious, the forest growth has usually extended.

Species of
pine
family

The Pine Family.—The pine family includes the various species of pine, tamarack, spruce, hemlock, fir, juniper, larch, cypress, and cedar. A few members of the family thrive in the warmer parts of the temperate zone, but for the greater part they flourish between the fortieth and sixtieth parallels. Most of the species found in the lower latitudes are mountain-trees. Pines constitute the greater part of the American and Russian forests. The American pine forest is thought to be the largest in the world.

Distribu-
tion

Properties
of white
pine

The *white pine* (*Pinus strobus*) is the most valuable member of the family. Its value is due to the fact that the wood is soft, clear, and easily worked. Not much inroad has yet been made upon the great Russian forest, owing to the great distance from water transportation. Rough lumber becomes too expensive for use when transported by land, but it will stand the expense of shipment by water many miles. The white pine of the United States is about exhausted. Wide board-sizes are almost as expensive as mahogany.

Exhaus-
tion

Local
names

The *Georgia* or *long-leaved pine* (*Pinus palustris*) is also commonly called *pitch pine*, *turpentine pine*, and *southern*

pine; it grows chiefly along the south Atlantic coast and in the northern counties of Georgia. It is harder than white pine and makes excellent flooring.

Occurrence
and uses

The *sugar pine* (*Pinus lambertiana*) occurs mainly in Oregon and California. The grain is fine and soft and the trees reach a large girth.

Occurrence

The *loblolly pine* (*Pinus taeda*) has a considerably larger area than the Georgia pine, and extends into Oklahoma. The *short-leaved pine* (*Pinus echinata*) occurs in small areas from New York to the Gulf of Mexico, and across to Missouri; it is the Chatahoochee pine of Florida. The *pitch pine* (*Pinus rigida*) occurs in various areas, mainly north of the Ohio River and west of the prairies. The lumber cut annually from these pines aggregates about thirty billion feet.

Occurrence
and uses

The common *white cedar* (*Chamaecyparis thyoides*) occurs along the Atlantic and Gulf coasts nearly to the Mississippi. On account of its fine grain it is much used in cabinet work and as a finishing wood. *Red cedar*, probably a different species, occurs along the Atlantic coast. It is largely used in the manufacture of lead-pencils, and the forests are wellnigh exhausted.

Occurrence
and uses

The *redwoods* are confined to the California coast, mainly in the coast ranges, near the ocean. Ordinary redwood (*Sequoia sempervirens*) resembles red cedar, is soft, and very fine in grain, and shrinks but little in seasoning. It is a most valuable timber both for common and for ornamental use. It very frequently attains a diameter of six feet; the big tree species sometimes exceeds sixteen feet in diameter and reaches a height of four hundred feet. The species commonly known as "Oregon pine," and "Douglas fir" (*Pseudotsuga taxifolia*, and *Pinus taxifolia*), furnish most of the lumber of the Pacific coast. Much of it is shipped to China and Japan.

Area of
growth

Uses

Oregon
pine;
uses and
commerce

Other Industrial Woods.—The oaks, like the pines,

Occurrence form a nearly continuous belt across the northern continents, lying mainly south of the pines; they do not extend much south of the thirtieth parallel. The white oak of the New England plateau and Canada commands a high price on account of its strength; a considerable quantity is exported.

Properties

Method of quartering The "quartering" of the lumber used in ornamental work is produced by sawing the logs, which have been split in quarters, so that the silver-grain shows on the faces of the boards. The bark of the oak is rich in tannic acid and it is much used in tanning leather. *Cork oak* (*Quercus suber*) grows mainly in Spain and Algeria.

By-products

Owing to the great demand for building-lumber, timber that was formerly used for other purposes, or was even rejected, is now utilized. *Cypress* (*Taxodium distichum*), formerly used only as "tank stock"—that is, for the manufacture of wooden cisterns—is now very generally employed as an inside finishing wood. Several species of scrub pine, growing mainly in mountain regions, which were formerly considered useless, because of their tendency to warp, are now sought for inside finishing. The same is true of oak, maple, birch, beech, and many other forest trees. Any tree that will yield a few boards ten feet in length and six inches wide looks good to the lumberman.

Utilization of timber formerly unmerchantable

Black Walnut (*Juglans nigra*) grows in the bottom-lands of the Mississippi Valley and Texas. The merchantable timber is nearly exhausted, and the area has not been reforested. *Hickory* (various species of *Hicoria*) is found in nearly every part of the United States east of the Rocky Mountains. It is the timber on which the motor-car builder depends for wheel spokes. It is exceedingly strong and durable. Much hickory is used in making axe handles.

Maple (various species of *Aceraceæ*) is much prized by

the manufacturers of furniture and cabinet wares. It is also a very superior wood for the floors of buildings. Within a few years *birch* (several species of *Betula*) has become very popular with furniture manufacturers. It is fine in grain and takes stain so uniformly that almost any rare wood can be closely imitated. *Ash* (mainly *Fraxinus americana*) grows profusely in the greater area of the United States; it is much used in the manufacture of tool handles and machine frames. *Sweet-gum*, or *red-gum* (*Liquidambar styraciflua*), also known as "alligator wood," is the "satin walnut" of the cabinet-maker. It is very fine in grain and takes a rich polish. The "*Circassian walnut*" of commerce is not the real wood of that name (*Pterocarya caucasica*) but a much coarser variety imported from Circassia. The natural color of the wood is intensified by artificial treatment.

Uses of
birch, ash,
sweet gum,
and
Circassian
walnut

Shade-Trees and Ornamental Woods.—A large number of trees are yearly transplanted, or else grown from seed, to be used as ornamental shade-trees. For this purpose the elm, maple, acacia ("locust"), linden ("lime"), catalpa, ash, horse-chestnut ("buckeye"), poplar, and willow are most common in ordinary temperate latitudes, both in Europe and America. In warmer latitudes the Australian eucalyptus ("red gum" and "blue gum"), magnolia, palmetto, laurel, arbutus, and tulip are common. The local trade in ornamental trees is very heavy; the trade is local for the reason that the transportation of them is very expensive.

Local
demand
for shade
trees

Tropical Woods and Tree Products.—Many of the tropical woods are in demand on account of their beautiful appearance, and in many species this quality is combined with strength and hardness. *Mahogany* is obtained from Mexico and the Central American States, and also from the West Indies. The former is classed as "Honduras";

Occurrence

Veneers the latter is generally known as San Domingo mahogany and commands the highest price. *Rosewood* is obtained from Brazil, and is used almost exclusively in piano-cases. Both are cut into thin veneers, to be glued to a less expensive body.

Occurrence *Ebony* is the heart of a species of persimmon obtained mainly in Ceylon and the East Indies. Very little of the so-called ebony is genuine; most of the ebony of commerce consists of fine-grained hardwood, stained black. *Jarrah*, an Australian wood, is now very generally used for street-paving, and for this purpose it has no superior. *Teak* probably has no equal for strength and durability. It is not touched by the teredo and other marine worms.

Properties *Boxwood* (*Buxus balearica*) is a high-growing tree, native to India, but growing best in the islands of the Mediterranean. The wood is very hard, of yellowish-brown color, and so fine in grain that it finds a ready market in nearly every part of the world. Probably the larger part is used by engravers. A large amount of the wood is also used in the manufacture of folding-rules, and in inlaying. **Uses** Constantinople is the principal market, and about ten thousand tons of the selected wood are sold yearly.

Market *Lignum vitæ*, or *guaiac wood* (*Guaiacum officinale*), grows profusely in the West Indies and along the Spanish Main. **Occurrence** It is used both in medicine and in the arts. Shavings of the wood steeped in water were once considered a cure-all, hence the name. The wood is very hard, heavy, and is split with the greatest difficulty. **Uses** It is therefore much employed in making mallet-heads, tool-handles, nine-pin balls, and pulley-blocks. In tropical countries it is employed for railway ties. West India ports are the chief markets, and the United States is the chief consumer.

Occurrence *Logwood* is the wood of a tree (*Hæmatoxylon campechi-
num*) growing in Central America and the West Indies.



A LOG RAFT, WINONA, MINN.



HAULING LOGS TO THE RIVER



Copyright, 1898, Detroit Photographic Co.

THE LUMBER INDUSTRY—A LOGGING STREAM, MENOMINEE, MICH.

Markets

The best quality comes from Campeche, and it is marketed mainly from Central American ports. It is almost universally used for dyeing the black of woollen and cotton textiles, and logwood blacks are the standard of color-prints.

QUESTIONS FOR DISCUSSION

In what structures has timber been supplanted by iron and steel?

In what manufactured article has timber supplanted the use of rags?

When a pine forest is cut away, what kinds of timber are apt to come up in place of the pines?

In what manner does the railway draw upon the forests?—the paper-maker?—the farmer?—the tanner?—the beaver?—the terebinto, or ship-worm?

From what country or countries do the following come: box-wood, rosewood, sandal-wood, cinchona, bog oak, jarrah?

FOR STUDY AND REFERENCE

Make a list of the trees growing in the State in which you live; so far as possible, obtain a specimen of each wood, prepared so as to show square, oblique, split, and polished sections; for what purpose, if any, is each used?

Consult "Check-list of Forest Trees of the United States" (U. S. Department of Agriculture).

CHAPTER XVI

SEA PRODUCTS AND FURS

THE world's fish-catch amounts probably to more than one-quarter of a billion dollars in value and employs upward of a million people; in the United States 200,000 are employed. In some localities, such as the oceanic islands, far distant from the grazing lands of the continents, the flesh of fish is about the only fresh meat obtainable. Even on the continents fish is more available and cheaper than beef. The fish-producing areas pay no taxes; they require no cultivation; moreover, they do not require to be purchased. In general, fish supplements beef as an article of food; it is not a substitute for the latter.

Value of
catch

Economic
features

The whale-catch excepted, fish are generally caught in the shallow waters of the continental coasts. The fish, in great schools, resort to such localities at certain seasons, and the seasons in which they school is the fisherman's opportunity. For the greater part, such shallows and banks are spawning-places. Most of the fish, however, are caught off the Atlantic coasts of Europe and North America, these localities being nearest to the great centres of population.

Occurrence
of schools

Where
mainly
caught

Whales.—The whale is sought mainly in cold waters, and at the present time the chief whaling-grounds are in the vicinity of Point Barrow. In the first half of the nineteenth century whale-fishing was an industry involving hundreds of vessels and a large aggregate capital. The industry centred about New England seaports.

Former im-
portance

Uses of
whale oil

The train-oil obtained from the blubber of the animal was used partly as a lubricant, but mainly for illuminating purposes. For this purpose, however, it has been superseded by coal-oil, gas, and electricity. It is still in demand as a lubricant, but the whale-oil of commerce is quite as apt to come from the blubber of the porpoise or the sea-cow as from the right whale. Whalebone is a horny substance taken from the animal's jaw, and is worth from three dollars to eight dollars per pound. It is used chiefly in the manufacture of whips. For other purposes, steel, hard rubber, and celluloid have taken its place.

Whalebone
and its
substitutes

Spermaceti
and its
substitutes

The substance called *spermaceti* is derived from the sperm-whale, an inhabitant of warm ocean-waters. Spermaceti is identical in its physical properties with paraffine, and the latter is now almost universally its substitute.

Occur-
rence,
value, and
uses

Ambergris, thought to be a morbid secretion or disease of the sperm-whale, is found in the body cavity of the animal and also in masses floating in the sea. It is used chiefly to give intensity to the odor of perfumes, and the best quality brings as much as five dollars per ounce. Most of the ambergris of commerce is obtained from the neighborhood of the Bahama Islands.

Economic
features

Cod.—In the amount of the product the cod-fisheries are the most important. The meat of the fish is not strong in flavor, and it is cured with little expense. So valuable is the annual catch that the banks and shallows which the schools frequent are governed by international treaties.

Occurrence

The cod is a cold-water fish, and the fishing-grounds are confined to rather high latitudes. The coast-waters of the Scandinavian peninsula and the shores of the Canadian coast, especially the Banks of Newfoundland, are the chief areas. The fishing-grounds of the Canadian coast are closed to foreign vessels inside a three-mile limit; beyond the limit they are occupied mainly by Canadian,

Restric-
tions

French, and American fishermen. By the terms of treaties foreign vessels may enter the three-mile limit under restriction to purchase bait and food-supplies, and to cure their fish.

Fishery
treaties

A large part of the cod-catch is exported. Tropical countries buy much of the product. In such countries it is more wholesome than meat; it is cheaper; moreover, the salted cod will keep for an indefinite length of time. A large part of the catch is sold to the Catholic states of Europe and America, where during certain times the eating of the flesh of animals is forbidden. Gloucester, Mass., London, England, and Trondhjem, Norway, are great markets for salted fish. The oil from the liver of the cod is much used in medicine.

Commerce
and
markets

By-
product

Herring, Alewives, and Sardine.—The herring is a much smaller fish than the cod, and, commercially, is much less important. They school in about the same waters as the cod, but are caught at a different season, gill-nets being usually employed. Practically no distinction is made between full-grown herring and alewives of the same size. The fish are usually cured by smoking, pickling, or salting, and in this form are either exported or sold in interior markets.

Occurrence

Prepara-
tion

The true sardine is found in latitudes a little farther south than the schooling-grounds of the cod. The most important fisheries are along the coasts of the Latin states of Europe. Sardine fishing is a great industry all along the New England coast of the United States, but the "sardines" marketed from this region are young herring. Indeed, nearly all sorts of small fry are sold in boxes bearing spurious French labels.

Location
of fisheries

Substi-
tutes

Salmon.—Most of the salmon are caught in the rivers flowing into the North Pacific Ocean. The fish are caught in traps and weirs at the time of the spring run, when they

Location
of fisheries

Spring run ascend the river to spawn. The rivers are frequently so congested with the salmon that thousands of tons are caught in a single stream during the run.

The salmon canneries of the Columbia River are very extensive establishments, but in the past few years they have been surpassed by the Alaskan fisheries, which produce not far from fifty million pounds each year. The dressed fish is cooked by steam, canned, and exported to all parts of the world. The growth and development of the industry has also made an enormous demand on the tin mines of the world. Canned salmon is the largest fish export of the United States. There are extensive salmon-fisheries in Norway, Japan, and Russia.

Other Fish.—*Mackerel* and *haddock* are caught near the shores of the North Atlantic. Most of the mackerel-catch is pickled in brine and sold in small kegs known as "kits." The *menhaden*-catch of the North Atlantic is converted into fertilizer. The *halibut* is a large fish that is rarely preserved. The area in which it is caught is about the same as that of the cod. *Shad* are usually caught when ascending the rivers of the middle Atlantic coast. In the United States, Chesapeake, Delaware, and New York Bays yield the chief supply. The *bluefish* and *barracuda* are warm-water fish. The market for fresh fish has been greatly enlarged by the use of refrigerator-cars.

The *sturgeon* is captured mainly in the rivers and lakes of the temperate zone. Those of the Black Sea sometimes attain a weight of 2,000 pounds. The flesh is of less importance than the eggs, of which caviare is made. Russian caviare is sold all over Europe and America, and not a small part of the product is made in Maine. The caviare made from the roe of the Delaware River sturgeon is exported to Germany. The *tunny* is confined chiefly to Mediterranean waters.

Method of
preparation

Importance of
export
trade

Food-fish
of North
Atlantic

Use of
menhaden

Food-fish
of Middle
Atlantic
coast

Refrigerator
cars

Sturgeon
and tunny

Caviare

The *anchovy* is caught on the coast of Europe ; most of the product is preserved, or made into the well-known "anchovy sauce." The *beche-de-mere*, or "sea cucumber," is a product of Australasian and Malaysian waters. Almost the whole catch is purchased by the Chinese, and it is exported to all countries having a Chinese population.

Anchovy
and beche-
de-mere

Oysters and Lobsters.—The oyster is among the foremost sea products of the United States in value. The oyster thrives best in moderately warm and sheltered waters. The coves and estuaries along the middle Atlantic coast produce the best in the world. Chesapeake Bay and Long Island Sound yield the greater part of the output. In the latter waters elaborate methods of propagation are carried out, and the yearly crop is increasing both in quality and quantity. The output of the Chesapeake beds has decreased materially ; that of the Long Island Sound beds has increased.

Conditions

Artificial
propaga-
tion

Oysters are plentiful along the Pacific coast of the United States and also in European coast-waters, but they are inferior in size and quality. The use of refrigerator cars and vessels has extended the trade to the extent that fresh oysters are shipped to points 2,000 miles inland ; they are also exported to Europe. Baltimore is the chief oyster-market.

Pacific
coast catch

Refrigera-
tor cars
and
vessels

The consumption of the lobster has been so great that the catch of the New England coast has decreased about one-half in the past fifty years, and the United States is now an importer. Most of the import, amounting to about one million dollars yearly, comes from Canada. The so-called lobsters of the Pacific coast of the United States are not lobsters, but crayfish.

Decreased
production

Fish Hatcheries.—The demand for fish has grown so great in past years that in many countries the waters, especially the lakes and rivers, are restocked. The eggs are

Necessity
of
restocking

Location of hatcheries hatched and the young fry are fed until they are large enough to take care of themselves. The chief hatchery and laboratory of the United States Fish Commission is at Woods Holl, Mass. As many as 860,000,000 eggs, **Distribution of eggs** small fry, and adult fish have been distributed in a single year. The State of New York has also a similar department for restocking its waters.

Preparation **Sponge.**—This substance is practically the skeleton of a low order of animal, growing at the bottom of the sea. The sponge is cut from the place of attachment, and the gelatinous matter is washed away after putrefaction. The **Location of industry** chief sponge-fisheries are in the neighborhood of Florida and the Bahama Islands.

Occurrence **Seal.**—The fur-seal is an amphibian, found only in cold waters. A few pelts are obtained along the Greenland coast, but the chief sealing-grounds of the world have been at the Pribilof Islands, in Bering Sea. The pelts of the young males only are taken. The rookeries of the Pribilof Islands have been so nearly exhausted, that the killing season has been suspended for a term of years. Much **Exhaustion of species** illicit seal-catching is still going on, however.

The skins are taken to London, via San Francisco, where the fur is dyed a rich brown color; London is the chief **Markets of pelts** market for dyed pelts; San Francisco for raw pelts; and New York, Paris, and St. Petersburg for garments. The pelts of the sea-otter are obtained mainly in the North Pacific Ocean.

Rare and expensive furs **Other Furs.**—The furs employed in the finest garments are in part the pelts of land animals living in polar regions. The sable, stone-marten, otter, beaver, and red fox are the most valuable. The Persian lamb is a Persian product, but most of the fur sold under that name is common sheepskin dyed and curled. The Russian Empire and Canada are the chief sources of supply. The Hudson Bay Com-

pany, with headquarters in the city of Winnipeg, controls most of the fur-trade of North America; the Russian furs are marketed mainly at Lower Novgorod. Leipzig, Germany, has been an important fur market for about five hundred years.

Fur
markets

Enormous quantities of rabbit-skins from Australia and nutria, a beaver-like animal from Argentina, are imported into the United States and Europe for the manufacture of the felt of which hats are made. The amount of this substance used may be realized from the fact that two hundred million people in the two countries wear felt hats.

Fur and
hair used
for felt

At the present time the fur markets and the department stores of the United States are filled with goods described as "electric" seal, "near-seal," "Australian black lynx," "Belgian lynx," and by similar names. These furs are all spurious. Almost all of them are the pelts of the rabbit, the muskrat, and the unfortunate house cat. There is no such animal as the Belgian lynx, and the Australian lynx is not black. There is no "Alaskan sable" from the commercial view, and the furs sold under this name are skunk pelts. The black fox and the silver-gray fox are animals of the same species as the common red fox. About ninety-eight per cent. of the skins sold under the first two names are dyed goods. "Blended" furs are dyed furs. The sea-otter is practically extinct. There is no "stone" mink except in the vocabulary of the unprincipled dealers.

Spurious
furs

QUESTIONS FOR DISCUSSION

Note an instance in which the search for deep-sea fishing-grounds has resulted in the discovery of unknown lands.

Why are not whale products as essential now as a century ago?

What international complications have arisen between the United States and Great Britain concerning the cod-fisheries?—the seal catch?



CHAPTER XVII

THE UNITED STATES—THE SEAPORTS AND THE ATLANTIC COAST-PLAIN

THE United States of America together with the possessions included within the domain of the Republic comprise an area somewhat greater than that of Europe.

Extent

With respect to latitude, the position of the main body of the United States is extremely fortunate. Practically all its area is situated in the warmer half of the temperate zone. Only a small part lies beyond the northern limit of the corn belt; wheat, oats, and barley are cultivated successfully throughout four-fifths of its extent in latitude; grass, and therefore cattle and sheep are grown in nearly every part. Coal, iron, copper, gold, and silver, the minerals and metals which give to a nation its greatest material power, exist in abundance, and the successful working of these deposits have placed the country upon a very high commercial plane.

Fortunate
situation
as to
latitude

Situation
as to
belt of
food-stuffs

Mineral
resources

Topographically the United States may be divided into the following regions:

The Atlantic Coast-Plain,

The Appalachian Ranges and the New England Plateau

The Basin of the Great Lakes,

The Northern Mississippi Valley Region,

The Southern Mississippi Valley and Gulf Coast,

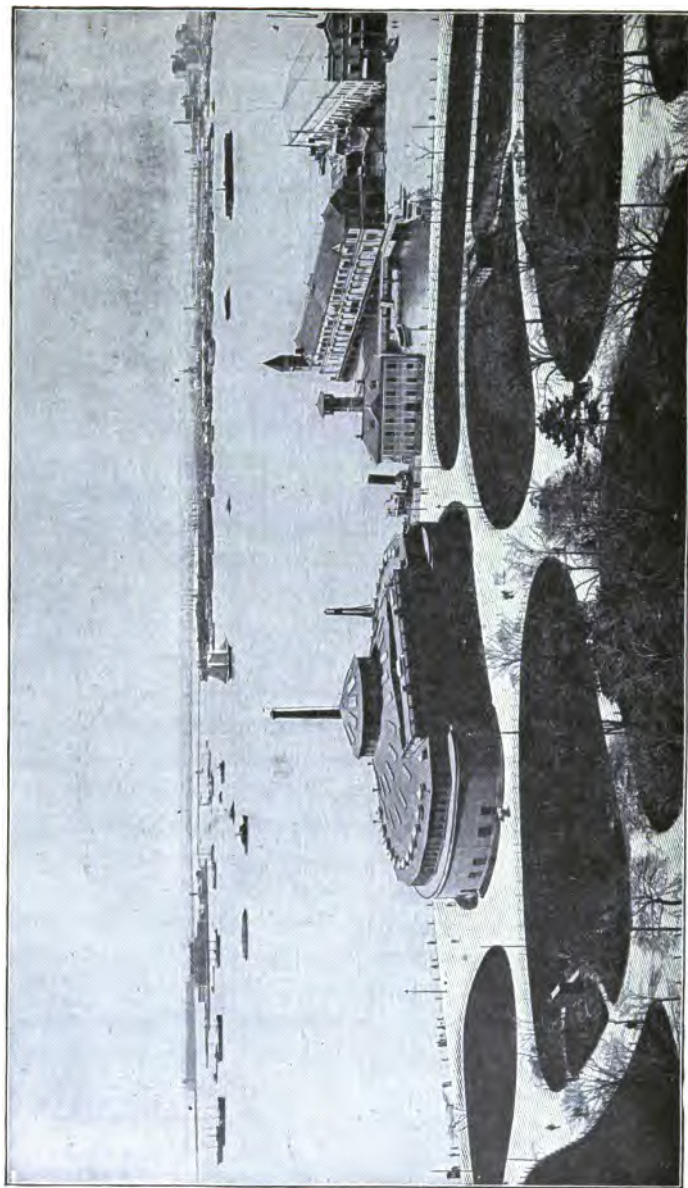
The Arid Plains,

The Plateau Region,

The Pacific Coast Lowlands.

The topographic and climatic features of these various

Topo-
graphic
and
climatic
regions



A HARBOR—NEW YORK BAY, AT THE BATTERY

regions have had a great influence not only on the political history of the country, but their effect has been even greater in determining its industrial development. They have resulted in the establishment of the various industries, each in the locality best adapted to it, instead of their diffusion without respect to the necessary conditions of environment.

Effects
upon
industries

These regions are therefore the approximate areas of fundamental industries. Thus, the New England plateau supplies the rest of the United States with light manufactures, such as cotton textiles, woollen clothing, hats, shoes, cutlery, books, writing-paper, household metal wares, etc., the excess being sold abroad. The middle and southern Appalachians, with the coal which forms their chief resource, supply the rest of the country with structural steel, from ores obtained in the lake regions, the excess going to foreign countries.

Illustration:
New
England
plateau

Middle and
Southern
Appa-
lachians

The northern Mississippi Valley grows nearly one-fourth of the world's wheat-crop. The wheat of this region and the Pacific coast lowlands supplies the country with bread-stuffs, the excess being sold mainly in western Europe. The Gulf States, which produce three-fourths of the world's cotton-crop, supply the whole country and about one-half the rest of the world besides with cotton textiles. The grazing regions produce an excess of meat for export; the western highlands furnish the gold and silver necessary to carry on the enormous commerce.

Northern
Mississippi
Valley

Gulf
States

Grazing
and
highland
regions

In the last twenty years the imports of merchandise per capita varied but little from \$12; the exports per capita varied from about \$12 to more than \$18.

Per capita
ratio of
business

The Atlantic Coast-Plain and the Seaports.—Throughout most of its extent the Atlantic seaboard of the United States is bordered by a low coast-plain. Along the northeastern coast of the United States the coast-plain is

Topog-
raphy

very narrow; south of New York Bay it has a width in some places of more than two hundred miles.

Results of
drowned
valleys

The existence of this plain has had a marked effect on the commercial development of the country. The sinking or "drowning" of the northern part of it has made an exceedingly indented coast. The drowned valleys, enclosed by ridges and headlands, form the best of harbors, and nearly all of them are northeast of New York Bay. South of New York Bay good harbors are comparatively few. For the greater part they occur only where drowned river-channels permit approach to the shore.

Fortunate
situation
of
New York

The most important port of entry in these harbors is *New York*, and it derives its importance from two factors. It has a very capacious harbor, into which vessels drawing as much as thirty-five feet may enter; its situation at the lower end of a series of valleys and passes makes it almost a dead level route from the Mississippi to the Atlantic seaboard. The importance of New York as the commercial gateway between European ports and the food-producing region of the American continent began when the Erie Canal was opened between the Great Lakes and tide-water. The completion of the canal for the first time opened the rich farming lands of the interior to European markets. Probably a greater tonnage of freight is carried yearly over this route than over any other channel of trade in the world.

Results of
opening
Erie Canal

Volume of
commerce

Extent of
docks

Clearings

Not far from two-thirds of the foreign commerce of the country passes through the port of New York. The waterfront of the city has an aggregate length of about three hundred miles, of which one-third is available for anchorage. The docks and piers, including those of Jersey City and Hoboken, aggregate about ninety miles in frontage.

About sixteen thousand sea-going craft enter and clear yearly, and an average of nearly twenty large passenger

and freight steamships arrive and clear daily, about one-half of them being foreign. The latter receive their cargoes from about three thousand freight-cars that are daily switched into the various freight-yards, a large part of which is through freight from the west.

Freight
exchange

The port of entry of *New York* is a centre of population of over four million, and although there are the in-

Population

dustries usually found in great communities, the greater business enterprises practically reduce themselves to export, import, and exchange. For this reason New York City is the financial, as well as the commercial centre of the continent. Most of the great industrial corpora-



Financial
centre

tions of the country have their head offices in the city. These are financed by more than one hundred banks, together with a clearing-house whose yearly business amounted in 1910 to considerably more than one hundred billions of dollars.*

Clearing-
house
statistics

Boston has been one of the leading ports of the United

*This sum represents more than ten times the amount of gold coin now in existence. Less than five per cent. of the business of the great industrial centres is a cash business. Even if the money existed, the trans-

Rank	States for considerably more than a century. It ranks second among the ports of the United States. Regular
Transit lines	lines of transit connect it with the principal ports of Great Britain and Canada. The coast trade is also very heavy. Boston is the financial and commercial centre of New England; the cotton, woollen, and leather goods passing
Character of business	through the port find their way to nearly every inhabited part of the world. The city controls a considerable export trade of food-stuffs from the upper Mississippi Valley. The
Clearings	vessels entering and clearing at Boston indicate a movement of about five million five hundred thousand tons, or
Volume of business	one-fourth that of New York. The clearing-house exchanges aggregate about eight and one-half billion dollars yearly.
Inland situation	<i>Philadelphia</i> , on account of its distance inland, is not fortunately situated for ocean commerce. Steamships of deep draught reach their docks at the lower end of the city under their own steam, but sailing-craft pay heavy towage fees. There are regular lines to Liverpool, Antwerp, West Indian ports, Baltimore, and Boston. Philadelphia is the centre of the anthracite coal trade, and this is the chief factor of its domestic trade. The imports of fruit from the West Indies, carpet-wool from Europe, and raw sugar from the West Indies, form the greater part of its foreign business. The manufactures are mainly carpets and rugs, locomotives and iron steamships, and refined sugar. The carpet-weaving and the ship-building plants are among the
Transit lines	
Character of business	
Manufactures	
Mechanism of clearing-houses	fer of such immense sums would greatly retard commerce. In order to effect a speedy settlement of payments, clearing-houses are established. At the clearing-house the representatives of the various banks meet daily and liquidate the checks drawn against one another; and although the total yearly volume of payment aggregates the sum mentioned above, the <i>balances</i> for a year are but little more than two billion dollars. Even this does not always represent cash payment, for a bank that is a debtor to another at the close of one day may be a creditor for an equal sum on the next.

largest in the world. The ocean movement of freight is considerably more than five millions of tons. Coal forms a considerable part of the coast trade. The yearly business of the clearing-house aggregates more than eight billion dollars.

Volume of
business

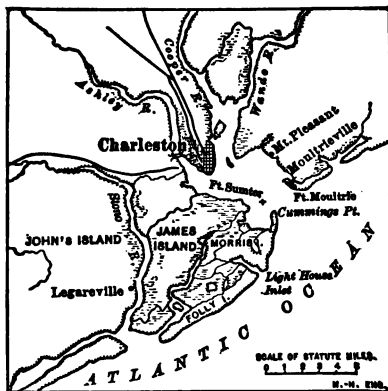
Baltimore is likewise handicapped by its distance inland. Sailing-vessels, however, require only a short towage, the docks being scarcely a dozen miles from Chesapeake Bay. The harbor is deep and capacious. The Pennsylvania and the Baltimore and Ohio railway lines have made Baltimore an important railway centre. The extension of the New York Central system to the Atlantic seaboard at Baltimore has made the city second to New York only in the export of bread-stuffs. The most noteworthy local industry is the oyster product, which is the greatest in the world. Nearly ten thousand people are employed, and during the busy season—from September to the end of April—about thirty carloads of oysters a day are shipped.

Inland
situation

Harbor

Transit
lines

Character
of business



CHARLESTON HARBOR

The total marine commerce of Baltimore in 1910 aggregated about \$107,000,000. The clearing-house exchanges for the year amounted to one and one-half billion dollars.

Volume
of business

Portland, Me., has good harbor facilities, but is distant from the great lines of traffic. Steamship lines, which in summer make Montreal a terminal point, occasionally make Portland their winter harbor. *Newport News, Savannah,*

Other
Atlantic
coast ports

Other
South
Atlantic
coast ports

Charleston, and *Brunswick* are growing in importance as clearing ports for the cotton and produce from the region west of them. *Norfolk* obtains importance on account of the United States Navy-Yard. The harbor, which is the estuary of James River, is one of the best in the United States and its commerce is growing rapidly. The nearby city of *Portsmouth* is commercially a part of Norfolk. *Newport News* is the seat of ship manufacture. Most of the peanut crop of the United States is marketed at Norfolk. Several trunk lines converge at Norfolk harbor, and the latter is defended by Fortress Monroe.

QUESTIONS FOR DISCUSSION

What are the requisites of a good seaport?

What is meant by the draught of a vessel?

For what purposes are pilots?

How are navigable channels marked and designated?

From the Statistical Abstract find six or more of the leading exports from each of the following ports: New York, Boston, Baltimore, Philadelphia, and the port nearest which you live.

FOR COLLATERAL REFERENCE

Statistical Abstract of the United States.

Statesman's Year-Book.

Industrial Evolution of the United States—Chapter II.

CHAPTER XVIII

THE UNITED STATES—THE NEW ENGLAND PLATEAU, THE SOUTH ATLANTIC COAST-PLAIN, AND THE APPALACHIAN REGION

THE manufacturing regions of the United States, which connect the country with the rest of the world, include the New England plateau, the Piedmont lands of the south Atlantic, and the Appalachian ranges.

Regions of
manu-
facture

The New England Plateau.—This region embraces the New England States and practically includes all the eastern part of New York and northern New Jersey. The abruptly sloping surface affords a great wealth of water-power, and the region is one of the most important centres of light manufacture in the world. This industry resulted very largely from the conditions imposed by the War of 1812 and its consequent non-intercourse acts.

Extent

Avail-
ability for
manu-
facture

Results of
War of
1812

The interruption of foreign commerce not only cut off the importation of manufactured commodities, but also made idle the capital employed. Manufacturing enterprises started in various parts of the United States, but they prospered in this region for three reasons—an abundance of power, plenty of capital, and business experience. Steam-power is largely supplanting water-power in the manufacturing enterprises, and in many instances the establishments have been moved to tide-water in order to get cheap coal.

Readjust-
ment

Hydro-electric power is also becoming an important factor in the manufactures of this region. The water-power of localities that are commercially inaccessible is

Hydro-
electric
power

Method of
transformation

used to generate electricity. The electricity, stepped-up to a very high voltage by a transformer, is conducted to the localities where it is to be used. There it is stepped-down by another transformer to the voltage required by the machine motors. The double transformation serves two purposes: the electricity is carried with less loss and a smaller copper wire is required.

Manu-
facture of
cotton
textiles

Chief among the manufactures are cotton textiles, the yearly output of which is about three hundred million dollars. About nine-tenths of the cotton goods made are consumed at home. Of the remainder, China purchases one-half, Great Britain and Canada take one-fourth, the South American and Central American states purchase most of the remaining output. The great improvement of spinning and weaving machinery has enabled the cotton manufacturer to export his wares to about every country in the world.

Manu-
facture of
leather
goods

Boots, shoes, and other leather goods are also important manufactures. The invention of improved machinery for making shoes has revolutionized the industry to the extent that a pair of shoes may be purchased anywhere in the United States for about half the price charged in 1880. Another result is the enormous importation of hides from South American countries and Mexico.

Reasons
for
develop-
ment of
manu-
factures

The New England plateau is also the centre of a large number of manufactures that require a high degree of mechanical skill and intellectual training, such as small fire-arms, machinery, watches and clocks, jewelry, machine-tools, etc. The location of such industries depends but little upon climate, topography, or the cost of transportation; it is wholly a question of an educated and trained people. Such manufactures are likely to remain in the region where they have grown up.

Centres of
manu-
facture

Lawrence, Lowell, Manchester, and Nashua—all on the Merrimac River; Lewiston, Waterville, Augusta, Woon-

socket, and *Adams*—each situated at falls or rapids—are great centres of cotton manufacture. *Fall River* has an abundance of water-power, and at the same time is situated on tide-water. Having the advantage of good power and cheap transportation, it has probably the greatest output of cotton textiles of any city in the world. *Lynn*, *Brockton*, *Haverhill*, *Marlboro*, and *Worcester* are centres of boot and shoe manufacture; they turn out about two-thirds of the product of the United States. Textile manufactures have also grown up in the Mohawk Valley, notably at *Little Falls* and *Utica*, attracted by the excellent facilities for transportation or by the available water-power.

Centres of
manu-
facture

Bridgeport and *New Haven* have very large plants for the manufacture of fire-arms and fixed ammunition; *Waterbury* and *Ansonia* for watches, clocks, and brass goods; *Meriden* for silverware, and *Waltham* for watches. *Worcester*, *Springfield*, *Hartford*, *North Adams*, *Fitchburg*, and *Providence* have each a great variety of manufactures. The foreign commerce of these manufacturing centres is carried on mainly through *Boston*. *New Haven*, *New Bedford*, *Providence*, *Salem*, *Gloucester*, and *New London* control each a very large local commerce.

Centres of
manu-
facture

The South Atlantic Coast-Plain.—South of New York Bay the Atlantic coast-plain attains an average width of nearly two hundred miles. The pine forests of this plain yield lumber, tar, pitch, and turpentine. The productive lands are valuable chiefly for their output of dairy stuffs, fruit, and "garden truck," which find a ready market in the larger cities. In order to encourage this industry, the railways make special rates for dairy products, fruit, and vegetables, and afford quick transit for such freight.

Extent

Character
of produce

Special
rates for
transportation

Industries
of
Piedmont
region

In the Piedmont lands, or foot-hills, manufacturing industries are rapidly taking shape. Along the Fall line where the coast-plain joins the foot-hills, the rivers reach

the lower levels by rapids or falls. The estuaries into which they flow are usually navigable for river-craft. The manufacturer thus has the double advantage of water-power and water transportation. The opening of the southern Appalachian coal-mines has also greatly encouraged manufactures in this region. *Richmond, Columbia, Milledgeville, Augusta, and Columbus* are thus situated. Their manufactures are very largely connected with the cotton-crop.

Centring
of indus-
tries at
Fall Line

Manu-
facturing
centres

Extent of
domestic
commerce

Character
of vessels

The domestic commerce of the Atlantic seaboard of the United States is probably larger than that of any other similar region in the world. It is considerably larger than the "round-the-island" trade of Great Britain. Much of this trade is carried by steam-vessels, but the three-masted schooner is everywhere in evidence, and these craft carry a very large part of the coal that is moved by water. This trade is restricted to vessels flying the American flag.

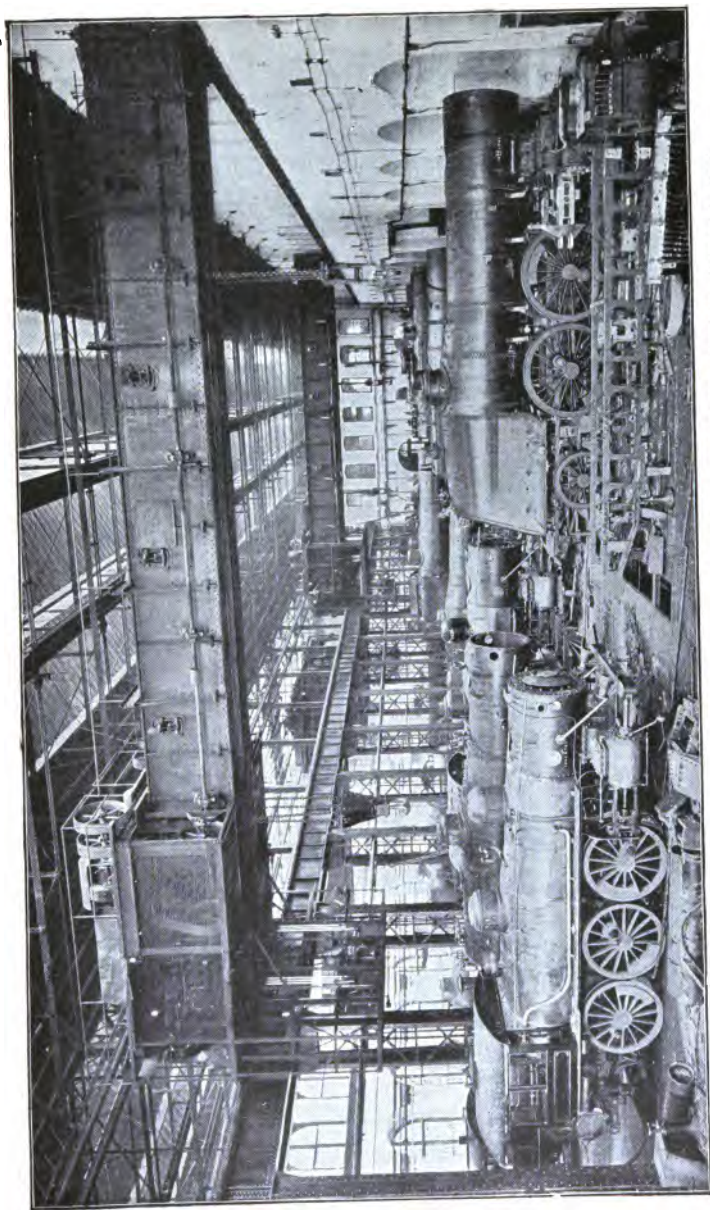
The Appalachian Region.—The middle and southern Appalachian region has become the most important centre of iron and steel manufacture in the world. This great development has resulted from several causes, the chief being the existence of coal and unlimited quantities of iron ore on the one hand, and unusual facilities for cheap transportation on the other. There are practically three areas of steel manufacture—one along the Ohio River and its tributaries in western Pennsylvania; another is situated along the south shores of Lake Erie and Lake Michigan; the third includes the Birmingham district in the southern Appalachians.

Reasons
for
develop-
ment of
steel
manu-
facture

Steel-
making
centres

Location
of Ohio
River
plants

The steel-making plants of the Ohio River are located with reference to the transportation of their products, and therefore are built usually alongside the river. The coal or coke is commonly shipped in barges of light draught; the manufactured products are carried by rail. The greater



STEEL MANUFACTURE—ERECTING SHOP OF THE BALDWIN LOCOMOTIVE WORKS, PHILADELPHIA

Shipment
of the ore

part of the ore is brought from the Lake Superior region. It is shipped at a very small cost from the ore quarries to the lake-shore, and by rail from the lake-shore to the manufacturing plant. In order to avoid heavy grades the ore railways are also built along the river-valleys.

Diversity
of mill
products

Some of the various steel-making plants are equipped for the manufacture of building or "structural" steel, others for rails and railway equipments, still others for tin-plate, for wire, or for billet steel. In a few mills armor-plate and ordinary plate for steel vessels form the exclusive product. The diversity of the product has led to the organization of great corporations, each of which controls half-a-dozen or more plants, the transportation lines necessary to carry the product, the ore quarries, and the fuel-mines. Most of these in turn have been merged into the United States Steel Company, probably the largest corporation in the world.

Merging of
corporations

Organiza-
tion of
United
States
Steel
Company

Reasons
for
develop-
ment of
steel
industry

The wonderful development of the steel industry in the United States is due to the use of labor-saving machinery, and to the superb organization. The wages paid for labor are higher than those paid in European steel-making centres; the cost of living is not materially greater. The price of steel rails, which in 1880 was forty-eight dollars per ton, in 1910 was about twenty-nine dollars per ton.

Centres
of steel
manu-
facture

Pittsburg, together with *Homestead*, *Carnegie*, *McKeesport*, *Duquesne*, and *Braddock*, is the chief steel-making centre of the Ohio River Valley. There are also large plants at *New Castle*, *Sharon*, *Scranton*, *Johnstown*, *Bellaire*, *Youngstown*, *Mingo Junction*, and *Wheeling*. The steel-plant and rolling-mills at *South Bethlehem* are designed especially for the manufacture of the heavy ordnance used in the army and navy. Nearly all the cities and towns of Pennsylvania, West Virginia, and eastern Ohio carry on manufacturing enterprises that depend on coal-mining and

Character
of manu-
facturing
enterprises

steel manufacture. The great and diversified manufactures of *Philadelphia* are due to its fortunate situation at tide-water, near the coal-mines. Cheap fuel and water transportation have made it one of the great industrial centres of the world.

Reasons
for manu-
factures
of Phila-
delphia

The anthracite coal of this region is used wholly for fuel and steam-making; it is shipped partly by water from Philadelphia, but mainly in hopper-cars, known as "gondolas," to the various points of consumption. The soft coal is used also for fuel and steam-making, but a large part of the product is converted into coke and used in the steel-plants.

Specific
uses of
coal

The petroleum products of this region are a leading export of the country, the states of western Europe being the chief purchasers. Of agricultural products, hay, dairy products, and tobacco are the only ones of importance. Natural gas is used both as a fuel and in manufactures.

Petroleum

Agri-
cultural
products

Natural
gas

The coal-mines and iron-making plants of the southern Appalachians have a considerable area. The chief manufacturing centres are *Birmingham*, *Richmond*, *Roanoke*, and *Chattanooga*. A considerable part of the Virginia ores find their way to the Ohio River steel-mills. Open-hearth steel is an important manufacture in Birmingham. A large part of the ores smelted in the southern Appalachian region are made into foundry iron.

Manu-
facturing
centres of
southern
region

QUESTIONS FOR DISCUSSION

What are the advantages and the disadvantages of manufacturing cotton textiles in the New England States?

Why have the mining of ore and the manufacture of steel become generally unprofitable in the New England States?

What causes have brought about the lowering of the prices of cotton textiles during the past fifty years?—of shoes?

What makes the manufacture of artificial ice a precarious business north of the latitude of Philadelphia?

What are the advantages and the disadvantages arising from the location of a manufacturing industry at a seaport?

What is the design of a protective tariff? What are its advantages and disadvantages?

Why are most of the great steel-making plants so remote from the mines of iron ore used in making steel?

FOR COLLATERAL READING

Industrial Evolution of the United States—Chapters III-V.

Mineral Resources of the United States.

Outlines of Political Science—Chapters VIII-X.

CHAPTER XIX

THE UNITED STATES—THE BASIN OF THE GREAT LAKES AND THE MISSISSIPPI VALLEY

THE principal agricultural region of the United States extends from the Appalachian ranges to the Rocky Mountains. A certain amount of bread-stuffs, meat, and dairy products are grown in nearly every part of the country for local use, but the grain, meat, and cotton of this region are designed for export, and are therefore factors in the world's commerce. The basin of the Great Lakes connects the Mississippi Valley with the Atlantic seaboard.

Region
of agri-
cultural
products
for export

The Basin of the Great Lakes.—This region includes not only the Great Lakes and the area drained by the streams flowing into them, but also a considerable region surrounding that commercially is tributary to the traffic passing over the lakes. This basin itself is a part of a trade-route destined very shortly to become one of the greatest highways of traffic in the world.

Extent

Position
on trade-
route

The lakes afford a navigable waterway which, measured due east and west, aggregates nearly six hundred miles. This route is interrupted at Niagara Falls and at St. Marys Falls, between Lake Superior and Lake Huron. On the Canadian side, Welland Canal, Lake Ontario, and the St. Lawrence connect Lake Erie with tide-water. In the United States the Erie Canal connects the lake with the Hudson River and New York Bay.

Navigable
extent of
Great
Lakes

Canal
connec-
tions

From the head of Lake Superior railway routes of minimum grades—the Great Northern and the Northern Pacific*—cross the continent to Puget Sound, the best harbor

Railway
routes of
low grade

* These roads are financed by the Northern Securities Company and form a link in the Hill-Morgan lines. Their intercontinental traffic is large.

approach to the Pacific coast of the American continent. The harbors of Puget Sound, moreover, are materially nearer the great Asian ports than any other port of the United States. The level margins of these lakes are road-beds for many miles of railway track; in many instances the railways are built on the tops of terraces that once were shores of the lakes.

Duluth, at the head of Lake Superior, became commercially important when the St. Marys Falls Canal was completed. Much of the tremendous tonnage of freight passing

through the canal is assembled at this place. The freight shipped consists mainly of farm products collected from an area reaching as far west as the Rocky Mountains. There is also a considerable shipment of iron ores obtained near by. *Buffalo*, at the lower end of Lake Erie, owes its activity to the trade in lumber, grain, and

other farm products that come from Western lake-ports. It is the eastern terminus of the lake-commerce and the western terminus of the Erie Canal.

Chicago, at the head of Lake Michigan, has a very heavy lake-trade. The mouth of Chicago River, the natural harbor of the city, has been improved by a system of basins and breakwaters. The river itself has been converted into a ship and drainage canal that is connected with the Illinois and Mississippi Rivers. It is now an outlet instead of a feeder to the lake, and the city built about old Fort Dearborn has become the greatest railway centre in the world.

Milwaukee has a situation in many ways resembling that

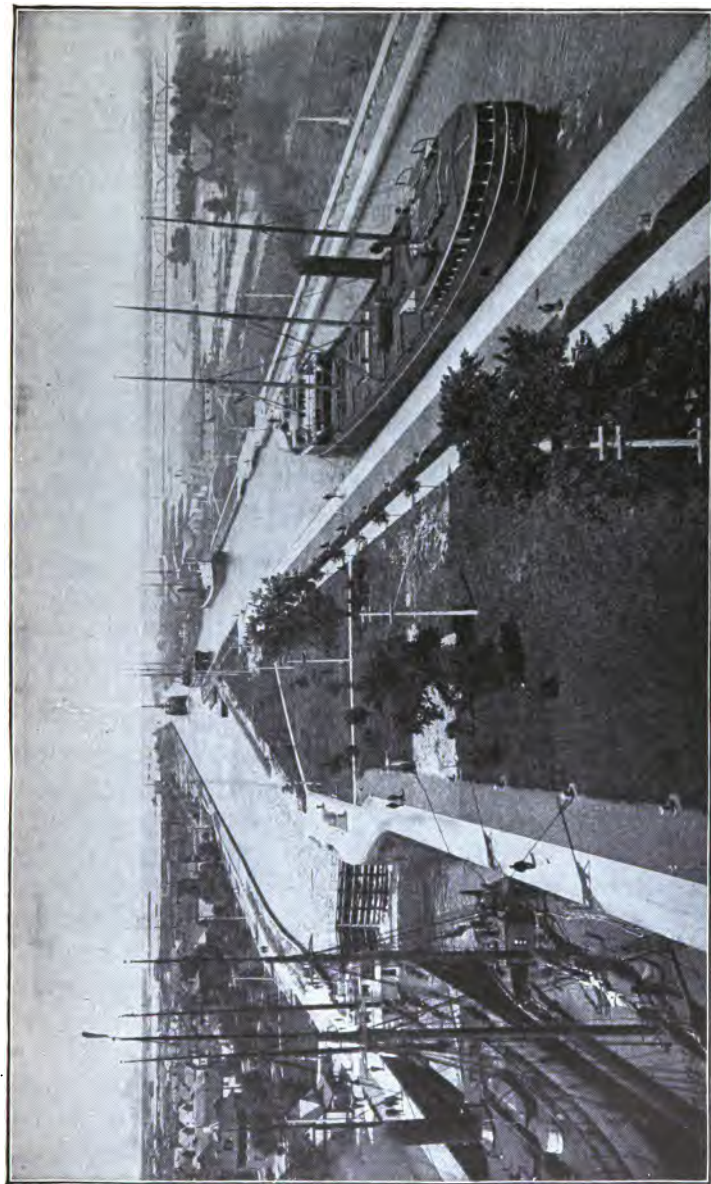
Lake
margins
as railway
road-beds

Character
of freight



Value of
position

Suitability
of
position



GENERAL VIEW OF LOCKS AND CANAL, SAULT STE. MARIE

Value
of location

of Chicago, its harbor being the mouth of Milwaukee River. Like Chicago, it owes its importance to its lake-trade. *Detroit* (with *Windsor*, Ont.) owes its growth partly to its strategic position on the strait connecting Lake Huron and Lake Erie, and partly to its position between the lakes. It is an important collecting and distributing point for lake-freights, and the chief centre of commerce with Canada. Several east-and-west trunk lines and local lines of railway have freight terminals in the city; it is also the centre of a very extensive system of interurban electric railways. It leads in the manufacture of automobiles. *Port Huron* (with *Sarnia*, Ont.) has a geographic position similar to that of Detroit, and is also an important lake-port. The St. Clair River is tunnelled at Port Huron and Detroit. *Cleveland*, *Toledo*, *Sandusky*, and *Erie* contribute largely to the lake-trade. *Grand Rapids* is the business centre of furniture manufacture of the United States.

Other
centres
of lake
commerce

Iron-ore
as a factor
of lake
commerce

The great iron-ore ranges about Lake Superior have had much to do with the growth of the local lake-trade. This has resulted in the establishment of a large number of shipping-ports near the head of the lakes, and also a number of receiving ports on the south shores of Lake Erie and Lake Michigan. Some of the latter have become also great manufacturing centres of structural iron and steel.

Reasons
for lake
commerce
in iron-ore

The lake shore centre of steel manufacture depends largely on the low cost of transporting the ore from the mines to the south shores of Lake Erie and Lake Michigan. This in part is offset by the increased cost of fuel which must be transported from the coke ovens. There is also a substantial gain in the decreased cost of shipping the manufactured products over nearby trunk lines. *Gary*, Indiana, is a city built to order for steel manufacture, on the south shore of Lake Michigan. Its equipment is the most modern in the world. *South Chicago*, *Toledo*, *Sandusky*,

Centres
of steel
manu-
facture



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AURORA IRON MINES, IRONWOOD, MICHIGAN

Centres
of steel
manu-
facture

Lorain, Cleveland, Ashtabula, Conneaut, Erie, and Buffalo are centres of steel manufacture because of their situation along the chief trade route of the United States.

Peculiar
industry
of Niagara
Falls

Niagara Falls, New York, has a unique industry in the manufacture of hydro-electricity. The power of the falls is used in producing an enormous ampereage of electricity which, after transforming, is distributed over a radius of more than two hundred miles. The street railways of Buffalo, Rochester, Syracuse, and Utica are operated by it. The electricity is also used in the manufacture of aluminium, carborundum, and graphite.

Distant
contribu-
tors to,
lake
commerce

Various centres of industry at a considerable distance from the Great Lakes are contributors to their trade. Thus, on account of the low rate for grain between *Chicago* and *New York City*—about $5\frac{1}{4}$ cents per bushel—there are yearly very heavy shipments of the grain designed for Liverpool. *St. Paul* and *Minneapolis* are also collecting and distributing centres of lake-freights. A considerable part of the business of the lake region is carried on by the Canadians, who have improved their resources for production and transportation to the utmost.

Extent and
climatic
boundaries

The Northern Mississippi Valley Region.—This region extends from the Appalachian ranges to the western limit of wheat and cotton growing. On the south it is limited by the cotton-growing region. Its boundaries are therefore climatic and commercial.

Character
of surface,
soil, and
climate

The surface is level; there is a rich, deep soil and an abundant rainfall. It has therefore become one of the foremost regions of the world in the production of corn, wheat, pork, dairy-stuffs, and general farm produce. The evolution of farming machinery is the direct result of topographic conditions. A level, fertile region naturally invites grain-farming on a large scale. This, in turn, must depend very largely on the ability of the farmer to

Reasons
for
evolution
of farming
machinery



' THE WHEAT INDUSTRY—HARVESTING WITH MCCORMICK SELF-BINDING REAPERS

plant and harvest his crops with the minimum of expense and time.

Hand-work in planting and harvesting has almost wholly given way to machine-work. Farming carried on under such conditions requires not only a considerable capital, but close business management as well. Some of the results have been very far-reaching. The machinery and other equipments require capital, and this in late years has been borrowed from Eastern capitalists. The prompt business methods of the money-lender brought about no little friction, and it is only within recent years that each adjusted himself to the requirements of the other.

The system of machine-farming to a great extent has prevented the subdivision of farms. As a rule, quarter and half sections represent the size of most of the farms, but tracts varying from five thousand to ten thousand acres are by no means uncommon. The chief drawback to this method in the case of wheat-farming, however, is the low yield per acre. The average yield per acre for the United States, a little more than twelve bushels, is scarcely half the average yield in Europe. Although the farmer has done much to reorganize his business methods, he has done but little to maintain the productivity of his land.

The cities and towns of this region are mainly receiving and collecting points for farm produce. Nearly every village is equipped with elevators and grain-handling machinery; the larger towns, as a rule, have stock-yards and the necessary facilities for cattle shipment; the large cities are usually centres of meat-packing. Most of the meat-packing is a necessity; for although cattle may be shipped alive and beef may be transported in refrigerator ships and cars, pork is not marketable unless pickled, salted, or smoked. The hog products thus exported, aggregating about one billion pounds yearly, must be prepared, there-

Need of
machine-
farming

Financial
readjust-
ment

Causes
that result
in large
farms

Unskilful
wheat
farming

Character
of cities
and towns

Facilities
for meat-
packing
and trans-
portation

Volume of
hog
products

fore, somewhere near the cornfields. Manufacturing enterprises are operated on a very large scale, but in the main their products are farm-machinery and the commodities required by a farming population.

Character
of manu-
factures

Education in agriculture is provided for in nearly every State in the Union. The agricultural colleges in the States composing this group rank among the best in the world. In addition to the ordinary courses in such institutions,

Education
in agri-
culture



AUTOMOBILE REAPER

there are also many experiment stations for the study of economic plants, cattle diseases, and insect pests.

Chicago is the largest food-market in the world. The industries of the city are almost wholly connected with the commerce of grain, pork, meat, and other food-stuffs. For the transportation of these commodities about thirty great trunk lines enter the city and about twelve hundred passenger trains daily arrive and depart from its stations.

Character
of business

Trans-
portation
facilities

The freight terminals are connected by transfer and belt lines, which receive and distribute the cars passing between the eastern and the western roads. More than five hundred freight trains, aggregating about twenty thousand cars, arrive and depart daily.

Facilities
for distri-
bution
of freight

Reason for
importance

Trans-
portation
facilities

St. Louis originally derived its importance as a river-port of the Mississippi, having been the connecting commercial link between the upper and the lower river. In recent years it has become the metropolis of the southern part of the food-producing region. In addition to the river-trade, still largely controlled at this point, it is the focus of more than twenty trunk lines of railway. Some of these, like the trunk lines of Chicago, handle freight



ELECTRIC "MULE" IN COAL MINE

exchanged between the East and the West; but a large proportion are receiving and distributing roads for Southern freight.

Geographic
causes of
growth

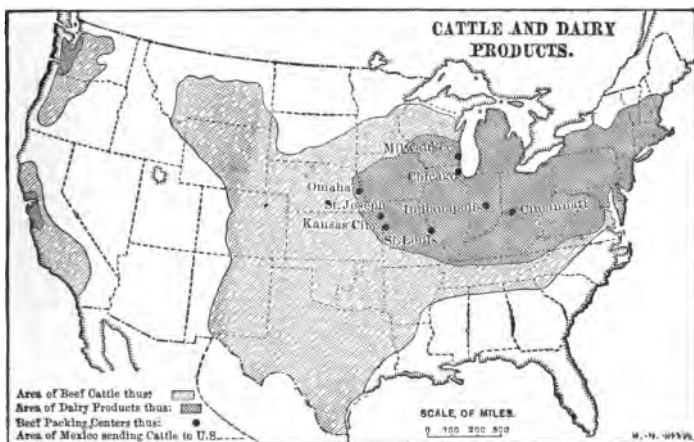
St. Paul and *Minneapolis* are the metropolis of the upper Mississippi. The former grew from a trading-post at the head of navigation; the latter gained its commercial prominence from the water-power at the falls of St. Anthony. The former has become the chief railway and distributing centre of the northern Mississippi Valley; the latter has the greatest flour-mills in the world, and an extensive lumber-trade. Both are situated on the trade-route between the United States and Asian ports, and distribute a part of the trade that comes from them.

The two *Kansas Cities*,* *Omaha*, *South Omaha*, *Hammond*, Ind., and *Sioux City*, Iowa, are stock-markets and meat-packing centres. The first two named are collecting and distributing points not only for the Mississippi Valley, but also for a considerable share of the Pacific Coast trade. Kansas City is also a transfer station for the cotton destined for China. From this place it is sent by way of Billings to Seattle, and thence shipped to China.

Meat-packing centres

Cotton transfer station

Peoria, Illinois, is the centre of great manufacturing in-



dustries, including potteries, and farm implements. *South Bend*, Indiana, has the largest wagon-making establishment in the world. *Springfield*, Ohio; *Dayton*, Ohio, and *Jackson*, Michigan, also in the belt of hard-wood timber and convenient to cheap fuel, have extensive manufactures of farm implements. The automobile industry centres largely in this section, a large part of the output being made in *Detroit*, *Racine*, *Dayton*, and *South Bend*. Rubber tires, or casings, and air tubes are made at *Akron*, Ohio,

Other centres of manufacture

Auto-mobile manufactures

* Their dividing line is the centre of a street.

the plants being among the largest in the world. At *Whiting*, Indiana, are extensive petroleum refineries.

Cincinnati is the metropolis of the Ohio Valley. Its situation on a bend of the river gives most excellent landing facilities; the easy grade from the bluff to the city, along Mill Creek, makes it accessible to the railways that enter the city. On account of low rates of transportation by river-barges, coal, pig-iron, and steel billets are floated to the city to be manufactured into other steel products. At *Indianapolis* much of the freight passing between Chicago, Louisville, Cincinnati, and Pittsburg is transferred. *Columbus*, Ohio, is a railway and farming centre.

Louisville is probably the largest tobacco market in the world. *Davenport*, *Rock Island*, and *Moline* form a single commercial centre; the last-named is famous for the manufacture of ploughs. *Dubuque*, *Burlington*, *Quincy*, and *Muscatine* are river-ports, all having a considerable trade in the lumber that is carried down the river. At *Keokuk*, Iowa, a dam across the Mississippi supplies the power for an immense hydro-electric plant. Boats pass through one of the largest canal locks in the world.

The Southern Mississippi Valley and Gulf Coast.—This region receives a generous warmth and rainfall. Cotton is its staple product, and nearly all the industries are connected with the growth, shipment, and manufacture of the crop and its side products. The cotton, raw or manufactured, is sold in about every country in the world.

The commerce of the cotton-crop begins with the first picking. The baled cotton is hauled by team to the nearest market-town, an item sometimes greater than the freightage from the nearest seaport to Liverpool.

The season for export lasts from September until the middle of January, during which time brokers are visiting the smaller markets in order to buy the cotton on commission. It is then shipped by rail or by river to the nearest general market, where it is sold to the foreign buyers and domestic manufacturers.

Export
season

New Orleans, the metropolis of the South, has usually the heaviest export of cotton, amounting to about one billion pounds each year. Much of this is received by water from the various river-ports. The city is not only a river-port, but an important seaport as well, controlling a large part of the foreign commerce of the Gulf. Several trunk lines of railway enter the city, which is a receiving and distributing depot for both Atlantic and Pacific freights. A considerable part of the former are sent by ocean steamships from New York. An elaborate system of sewerage, and a good water-supply—all recently put into operation—have made the city one of the most attractive in the United States.

Character
of
commerce

Galveston is a leading port for cotton export. It has the advantage of a fine harbor on the seaboard. The growth of the export trade is due chiefly to the increasing cotton crop of Texas. Shipments from Galveston begin in September, the Texas crop being the first to mature. *Savannah* and *New York* rank next in their exports. *Pensacola* and *Brunswick* are also important points of export. *Memphis*, *Vicksburg*, *Shreveport*, *Houston*, and *Montgomery* are important collecting stations for the cotton.

Other
cotton
markets

About one-third of the crop is retained for manufacture in the United States; one-third is purchased by Great Britain, one-sixth by Germany, and most of the remainder by France, Italy, Spain, and Japan. Of the manufactured cotton goods, the Chinese are the heaviest buyers, taking about half the entire export. Most of the Chinese purchase is landed at Shanghai.

Distribu-
tion
of crop

Character
of manu-
factures

By-
products

Centres of
trade and
manu-
facture

Cane-
sugar
industry

Tobacco
industry

Fruit
cultiva-
tion

In the main, the manufactures of this region closely concern the cotton industry. The increase in the manufacture of textile goods has been very great, and a large part of the cotton now manufactured in the New England States and abroad, in time will be made in the cities and towns of this section. In addition to the textile goods, cottonseed-oil is an important product. A part of this is used in the mechanical arts, but the refined oil is used mainly for domestic purposes. A considerable part of the latter is used to adulterate olive-oil, and in some instances is substituted for it. The refuse of the seed is made into fertilizer.

Atlanta is one of the foremost cities in the South in the manufacture of cotton textiles and products. Commercially its situation resembles that of Indianapolis; it is a focal point of the chief trunk lines of railway in the South, and has the principal railway clearing-house. Like New Orleans, it is an educational centre and one of the foremost in the South. *Macon, Dallas, Fort Worth, and San Antonio* are growing commercial centres. The last named is also a famous winter resort.

The manufacture of cane-sugar has been an industry of Louisiana for more than a century. Since the advent of beet-sugar, however, it has been a somewhat precarious venture, and has depended for existence very largely upon tariff protection and bounties paid to the American sugar-makers. Tobacco manufacture centres at *Tampa* and *Key West*. Cuban leaf is there made into cigars.

Fruit culture is a leading industry. Great quantities of melons, pineapples, oranges, and small fruit, which form the early crop, are shipped to northern markets. The orange groves are mainly in Florida. The crop is exhausted about the time that California oranges are shipped East. A great deal of tropical fruit is brought from Mexi-

can, Central American, and South American ports. This trade is controlled mainly at *Mobile*, which is also a lumber-market.

Markets
for tropical
fruits

The Arid Plains and the Grazing Region.—This region includes the high plains approximately west of the 2,000-foot contour of level, together with a part of the plateaus of the western highland region. It is essentially one of grazing. Formerly there was an attempt to make wheat-growing the chief industry, but on account of the limited rainfall not more than three crops out of five reached maturity.

Character
of industry

The earlier cattle-growing was carried on in a somewhat primitive manner; the cattle herded on open lands, wandering from one range to another, wherever the grazing might be good. The ownership of the cattle was determined by the brand the animal bore,* and the herds were "rounded up" twice a year to be sorted; at the round-up the "mavericks," or unmarked calves and yearlings, were branded. In time the ranges became greatly overstocked; the winter losses by starvation were so heavy that a better system became imperative. The "rustler," or illicit cattle-grower, was compelled to adopt square methods of doing business, or else to abandon it altogether.

Features
of grazing
industry

In time, the grazier was compelled to fence his land, and also to grow alfalfa for winter foddering. The great open ranges have therefore been broken up and fenced wholly or in part. The fencing, moreover, has kept a dozen or more of the largest wire-mills in the world turning out a product that is at once shipped West. As a rule, the

Reorgani-
zation of
grazing
industry

* The brand consisted of any specific device, such as an initial, a monogram, or a conventional form that might be easily recognized. The mark was registered according to law and branded with a red-hot iron on the flank of the animal. Ear-marks, such as notches or similar devices, also indicated ownership.

Brands

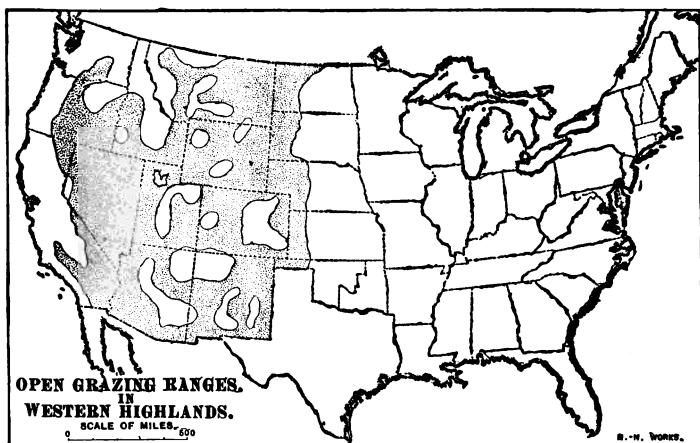


A DESERT REGION—TOO DRY FOR THE PRODUCTION OF FOODSTUFFS

top wire is set on insulators and used for telephone connection.* This method of cattle-growing has improved the business in every way. The cattle are better kept; the loss by winter killing is very small; the "long-horn" cattle have given place to the best breeds of "meaters," which are heavier, and mature more quickly.

Improved
methods

The success of stock-growing in this region is largely a question of climate. The sparse rainfall permits the



growth of several species of grass that retain nutrition and vitality after turning brown under the fierce summer heat. Ordinary turf-grass will not live in this region, nor will it retain its nutrition after turning brown if rain falls upon

Climatic
control of
industry

* In many cases Government land, not owned by the rancher, has been fenced in. No objection was made, however, until the sheep-grazier came. He demanded the removal of the fences, claiming that he had an equal right to graze his herds on public lands. But inasmuch as a range once grazed by sheep is ruined for cattle-growing, the quarrel between the grazier and the sheep-owner became fierce and blood-thirsty. In the end, the cattle-grower was not only compelled to fence his own land, but also to cease fencing the land that he did not own.

Quarrel
between
graziers



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ON A TEXAS CATTLE RANCH

it. The native grass is not materially affected by a shower or two; it is fairly good fodder even when buried under the winter's snow. The existence of this industry, therefore, turns on a very delicate climatic balance.

Of the beef grown in the United States the export product is derived mainly from this region. In 1909 the value of cattle and hogs exported had fallen off about one-half as compared with the exports of 1900. The export of meat and dairy products aggregated about twenty million dollars less than in 1900. This decrement is due in part to increased cost of meat to the consumer, and in part to the home demand of a rapidly growing population. Most of the cattle and fresh beef exported are shipped from New York and Boston.

Volume of
products

Reasons
for
decreased
export

All but a very small part of this product is consumed in Great Britain, France, and Germany. The cattle are collected for transportation at various stations and sidings along the railways that traverse this region. *Cheyenne* is one of the largest cattle-markets in the world. The canned and pickled products are shipped from one or another of the meat-packing centres. A considerable part is sent to the cold-storage warehouses on or near the Atlantic seaboard.

Foreign
markets

Preserving
and cold-
storage

Wool has become a very valuable product, and the sheep grown in this region number about one-half the total in the United States. The growing of macaroni-wheat is extending to lands that fail to produce crops of ordinary wheat.

Other
products

QUESTIONS FOR DISCUSSION

In what ways does the basin of the Great Lakes facilitate the commerce of the United States?

How has the topography of the Mississippi Valley affected the evolution of farming-machinery?

Why are shippers willing in many cases to pay an all-rail rate on wheat sent to the Atlantic seaboard, nearly three times as great as the lake and canal rates?

The acre-product of wheat in the United States is about twelve bushels; in western Europe it varies from twenty-five to more than forty bushels; to what is the difference due?

What is meant by sea-island cotton?—for what reasons is cotton imported from Egypt and Peru into the United States?

In what manner is cotton used in the manufacture of pneumatic tires, and why is it thus used?

What are refrigerator-cars?—refrigerator-steamships? Name some of the regulations required in shipping cattle.

Why have American meats been debarred at times from European markets?

Find the value of cotton and meat exported to the following-named countries: Great Britain, France, Germany, Italy, China.

FOR COLLATERAL READING AND REFERENCE

The Wheat Problem—pp. 191 *et seq.*

Statistical Abstract.



DIFFICULT RAILROADING—LAS ANIMAS CAÑON

CHAPTER XX

THE UNITED STATES—THE WESTERN HIGHLANDS AND TERRITORIAL POSSESSIONS

Topog-
raphy

THE western part of the United States consists of a succession of high mountain-ranges extending nearly north and south. The two highest ranges, each about two miles high, enclose a basin-shaped plateau about one mile high. This basin is commonly called the "plateau region." The rim ranges are broken in a few places by passes that the transcontinental railways thread. West of the Sierra Nevada ranges are the fertile Pacific coast lowlands.

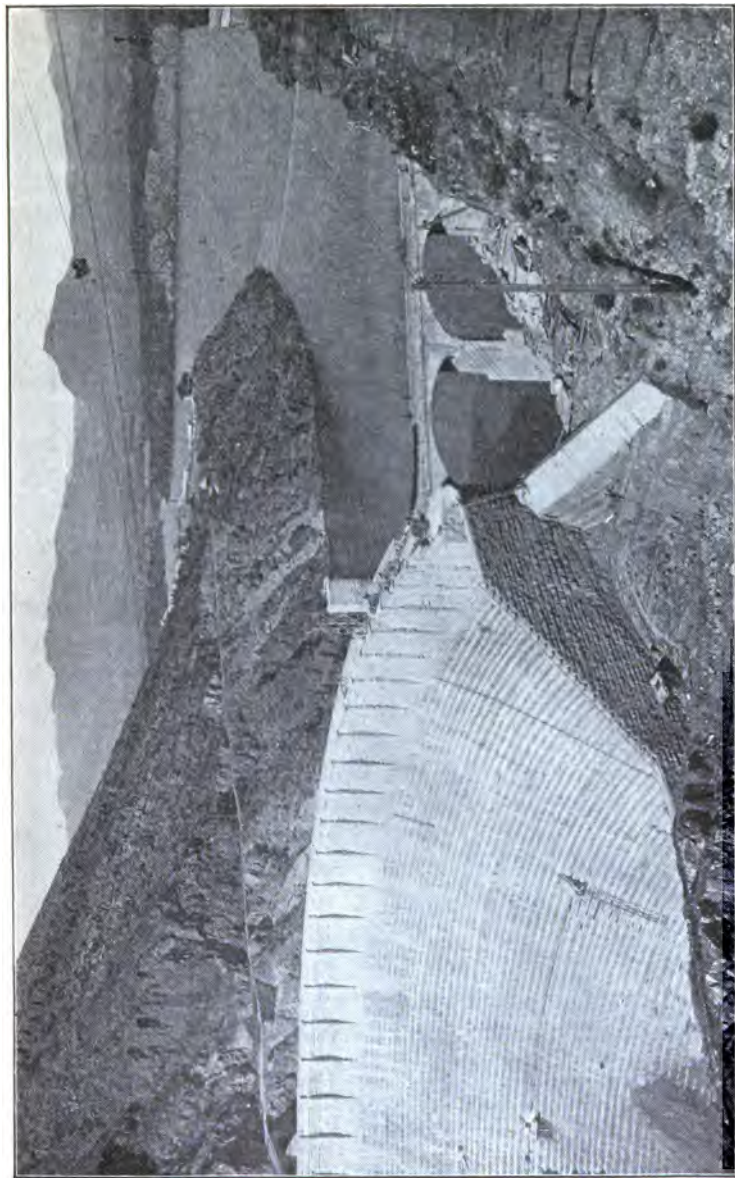
Rainfall

Location
of farming
lands

The Plateau Region.—This region is generally arid, but on the higher plateaus the rainfall is sufficient to produce forest trees and grass. The general conditions of rainfall and topography forbid any great development of agriculture by ordinary methods. Farming is confined to the river flood-plains, the parks, and the old lake beds and margins. A considerable area in Eastern Washington and Oregon, however, receives enough rain to grow food-stuffs.

Reclama-
tion of
arid lands

An area estimated at several million acres, little by little, is being made productive by irrigation, however. The Reclamation Act, which became a law in 1902, was a project of former President Theodore Roosevelt. Its funds "are derived from the sales of public lands, a part of the receipts being set aside for the purpose of constructing reservoirs whereby lands heretofore unproductive may be converted into good farming lands. At the close of 1910,



From a photograph by the U. S. Reclamation Service, Washington.

ROOSEVELT DAM, SALT RIVER PROJECT, ARIZONA
THE CONCRETE DAM IS CONVEX TOWARD THE ARTIFICIAL LAKE, IN ORDER TO RESIST THE PRESSURE OF THE WATER

Cost of
reclama-
tion

not far from one million acres of desert land had been reclaimed. The cost of reclamation was about sixty million dollars and the crops produced on these lands in 1910 aggregated fourteen millions of dollars. Aside for the impounding dams, more than four thousand miles of irrigating ditches were also constructed.

Recla-
mation
projects

Among the "projects," as they are called, now completed are some of the greatest dams and reservoirs in the world. The Roosevelt dam across Salt River cañon, Arizona, has made possible the cultivation of nearly a quarter million acres. In addition it has made available over seven thousand horse-power that can be electrically transmitted to any part of the valley. Similar projects are under way, or nearing completion, in a dozen or more localities. In each case, a dam of rubble masonry, or of concrete, is built across a narrow part of a river cañon. The dam raises the water level one hundred feet or more, and makes a storage reservoir large enough to furnish water to the cultivable land below. Canals are then constructed from the reservoir to the various parts of the cultivable lands, and smaller ditches carry the water to every part of the latter. The waste water at the spillway of the dam is used to create hydro-electric power.

Method of
reclama-
tion

Relative
value of
desert and
reclaimed
lands

The lands of the plateau region, that cannot be irrigated, are rarely worth more than a few dollars per acre; irrigated lands, on the contrary, are easily worth from one hundred to one thousand dollars an acre. A single acre frequently yields four or five times as much as an acre in a region of ordinary rainfall. As many as six or seven crops of alfalfa may be grown on some of these lands every year. The fruit, mainly apples, cherries, peaches, and oranges, grown on reclaimed lands is of unusually fine quality.

Character
of crop

Not much of the crop of this region, the fruit and wool

excepted, leaves the vicinity in which it is grown, on account of the expense of transportation. In the matter of the transportation of their commodities, the dwellers of the western highlands are much handicapped. The building of railways is enormously expensive, and in a region of sparse population there is comparatively little local freight to be hauled. The difficulties of developing such a region from a commercial stand-point, therefore, are very great.

Difficulties
of trans-
porting
crops

Mining is an important industry of this section, and silver, gold, and copper are its most important products. Since the discovery of precious metals in the United States, this region has produced gold and silver bullion to the value of over four billion dollars. This sum is about one-fourth the value of the railways of the country, and from 1865 to 1880 a large part of the capital invested in railway building represents the gold and silver of these mines. In the last twenty years of the past century they produced an average of about one hundred and twenty-five million dollars per year, and this average is constantly increasing.

Value of
mine
products

Coal-measures extend along the eastern escarpment of the Rocky Mountains, and these are destined at no remote day to create a centre of steel and other manufactures. Several of the railways operate coal-mines in Colorado and Wyoming for the fuel required. A limited supply of steel is also made, the industry being protected by the great distance from the Eastern smelteries.

Coal
measures

Denver is the chief active centre of finance of the mining industry in the western highlands, although many of the great enterprises derive the capital necessary to develop them from *New York* and *San Francisco*. *Leadville*, *Cripple Creek*, *Butte*, *Helena*, and *Deadwood* are regions of gold and silver production. *Virginia City* is the operating base of the famous Comstock mines. At *Anaconda* is the

Centres of
mining
industry

Centres of
agriculture

chief copper-mine of this region. *Salt Lake City* and *Ogden* are the centre of the Mormon agricultural enterprises. *Santa Fé*, *Las Vegas*, and *Albuquerque* are situated in an agricultural and stock-growing country.

Other
commercial
centres

Spokane and *Walla Walla* are commercial centres of the plains of the Columbia River. The former is the focal point of a network of local roads that collect the wheat and other farm products of this region; the latter is the collecting point for much of the freight sent by steamboats down the Columbia River from *Wallula*. Railway transportation has largely superseded river-navigation for all except local freights, however. *Boisé City* is the financial centre of considerable mining interests.

Seasonal
rainfall

The Pacific Coast Lowlands.—Climatically this region differs from the rest of the United States in having a rainy and a dry season—that is, the rainfall is wholly seasonal. In the northern part the rainfall is sixty inches or more, and rain may be expected daily from the middle of October to May. In central California the precipitation is about half as much, the rainy season beginning later and ending earlier. In southern California there are occasional showers during the winter months, aggregating ten or twenty inches.

Wheat-
growing

The level valley-lands have no superior for wheat-farming, and in but one or two places is the rainfall insufficient to insure a good crop. In the San Joaquin and southern valleys of California the harvest begins in May, in the Sacramento Valley in June, and in the Willamette and Sound Valleys of Oregon and Washington in July. The wheat goes mainly to Great Britain by way of Cape Horn. It cannot be safely shipped in bulk, and the manufacture of jute grain-sacks has become an important industry in consequence. The yearly wheat product of this region is not far from eighty million bushels.

Wheat
harvestMarketing
of wheat
cropVolume of
crop



GOLD MINING—CRIPPLE CREEK, COLORADO

Value of fruit crop

Fruit is a valuable product of the foot-hills of the Sierras, and in southern California oranges, lemons, and grapes are now the staple crop. In some cases the average yield per acre has reached a value of five hundred dollars. Some of the largest vineyards in the world are in this region. The Zinfandel claret wine and the raisins find a market as far east as London, and considerable quantities are sold in China and Japan. The navel orange, although not native to California, reaches its finest development in that State. A large part of the fruit-crop of California is handled at Minneapolis, Chicago, St. Louis, and New York. It is transported in special cars attached to fast trains.

Commerce of fruit

Oregon wool

Wool is an important crop. In the northern part the sheep thrive best in the foot-hills. The valley of Umpqua River, Ore., produces about seventeen million pounds of wool yearly, the staple being of excellent quality. California produces nearly as much of the finest merino staple. A considerable part is manufactured in the mills of the Pacific coast. The Mission Mills blankets made in San Francisco are without an equal elsewhere.

California merino

Gold mining

The discovery of gold by John Marshall in 1848 resulted in a tremendous inflow of people to the gold-fields of California. It also was a factor in the acquisition of the territory composing the Pacific coast States. The first mining consisted merely in separating the metal deposited in the bed-rock of streams by washing away the lighter material. In time, the quartz ledges which had produced the placer gold became the chief factor in gold mining. California is still one of the leading States in the production of gold.

Quick-silver

Quicksilver mining is an important feature of the mining interests of the Pacific coast, and the mines of the coast ranges produce about half the world's output. Borax and salt are obtained in the dry lake beds and "sinks" of the desert region.

Borax

Lumber manufacture is an important industry. Douglas spruce, commonly known as "Oregon pine," grows profusely on the western slopes of the high ranges, the belt extending nearly to the Mexican border. It makes a most excellent building-lumber, especially for bridge-timber and framework. Masts and spars of this material are used in almost every maritime country. Sugar-pine is less common, but is abundant. It is largely used for interior work. Several species of redwood occur in central California, confined to a limited area. The wood is fine-grained and makes a most beautiful interior finish.

Oregon
pine and
its uses

Sugar-
pine

Redwood

San Francisco is the metropolis of the Pacific coast of the United States. It is the terminus of several transcontinental railways, and the centre of a network of local roads. Steamship lines connect the city with Panama, the Hawaiian Islands, Japan, and Australian ports; coast steamships reach to the various ports of Alaska, Puget Sound, Oregon, and California. It is also the financial as well as the commercial centre of the Pacific coast. *Los Angeles* is the centre of the fruit-growing region, of the principal oil production of the Pacific coast, and of extensive manufactures. It has absorbed the port of *San Pedro*. The city is situated at the junction of trade routes opening north, east, and south. *Stockton*, *Port Costa*, and *Sacramento*, all on navigable waters, are wheat-markets. *Portland* (Ore.) is the metropolis of the basin of the Columbia and Willamette Rivers. Navigation of the former is interrupted by falls or rapids at *Dalles* and *Cascades*, but boats ascend as far as *Wallula*, Washington, and *Lewiston*, Idaho, on Snake River. The lower Willamette is also made navigable by means of a canal and locks at Oregon Falls. Portland is also a terminus of several transcontinental railways.

Centres
of
commerce

Puget Sound is a "drowned valley," with an abundance

of deep water. The score or more of harbors are among the best in the world. *Seattle* and *Tacoma*, the leading ports, are terminals of great transcontinental railways, and also of the most important trade-route across the continent. Lines of steamships connect Seattle with Japan and China, and the commerce passing through this gateway is drawn from a territory that extends more than half-way around the world. These ports are destined to become the chief American ports in the Asian trade.

Irrigation canals leading from the Colorado River into the heart of the Colorado desert have made productive many square miles of land that were regarded as sterile. This area is included in an old sea bottom once covered by the Gulf of California. Inasmuch as the lands in question are below sea level they are irrigated by drawing the water by canals directly from the Colorado. This region, now known as Imperial Valley, has become one of the most productive parts of California. *Imperial*, the commercial centre, has an outlet to the markets of the Pacific coast by way of the Southern Pacific Railway.

Alaska.—The most productive industry of the coast region of the territory is the fisheries. For many years the

Puget
Sound
ports

Irrigation
projects

Imperial
Valley

Fisheries



PUGET SOUND

Pribilof Islands produced practically all the seal-pelts used in the manufacture of seal-fur garments. So many seals were killed, however, that the species seemed likely to become extinct, and seal-catching has been forbidden. The salmon fisheries are very productive.

The discovery of gold along the Klondike River and in the beach sands of Cape Nome was followed by the development of surface mines that produced a large amount of gold. Extensive fields of bituminous and lignite coal have been surveyed but only a few tons are mined. Several of the fields are within marketable distance of tide water. Gypsum is obtained near Juneau, and marble is quarried on Prince of Wales Island. The reindeer has been imported and thrives. The coast slopes are well adapted to cattle and hardy sheep. Fur trapping is an important industry.

For the better transportation of products, a railway has been completed from *Skagway* across White Pass to *White Horse*, the head of navigation of the Yukon. About twenty steamboats are engaged in the commerce of the river. *Skagway* and *Dyea* are collecting points for the commerce of the Klondike mines. *Valdez* is an important trading-post. *Juneau*, the capital, has probably the largest quartz-mill in the world.

Porto Rico.—Porto Rico, formerly a Spanish colony, is now a possession of the United States. The island is about the size of Connecticut and has a population somewhat greater. The industries are almost wholly agricultural, and most of the surface is under cultivation. Sugar, coffee, and tobacco are grown for export, and these constitute the chief source of income. The coffee-crop is a valuable product and commands a high price on account of its superior quality. It is sold very largely to European coffee-merchants, and is marketed as a "Mocha." Exports

Gold-mining

Coal beds

Other industries

Transportation and commerce

Area and population

Coffee crop

Commerce

of fruit to the United States are increasing. In 1901 the exports to the United States markets consisted chiefly of sugar, tobacco, and cattle products. Porto Rican cigars rank next to Havana cigars in quality. The imports from the United States were chiefly cotton-prints and rice.

Railways
and
highways

The facilities for the transportation of products are not good. The railway lines have a total mileage of about one hundred and fifty miles. An excellent wagon-road, built by the Spanish Government from San Juan to Ponce, has been supplemented by several hundred miles of roads built under the direction of the military authorities. *San Juan* and *Ponce* are the leading seaports and centres of trade.

History

Hawaiian Islands.—These islands were discovered by a Spanish sailor, Gaetano, in 1549, and again visited by Captain Cook in 1778. Up to 1893 they formed a native kingdom. In 1893 foreign influence was sufficient to overthrow the native government, and in 1898 they were formally annexed to the United States and about the same time organized as a territory. From an early date the geographic position of the islands has made them a convenient mid-ocean post station, and they have therefore become a most important commercial centre.

Com-
mercial
positionCharacter
of
population

Of the various islands composing the group, Hawaii, Maui, Oahu, Kauai, Molokai, Lanai, and Niihau are inhabited. About one-fifth of the population consists of native Hawaiians; a little more than one-fifth is white; forty per cent. is Japanese; the remainder are mainly Chinese and Porto Ricans. The native population is decreasing. About ninety-five per cent. of the property is owned by the white people—Americans, English, and Germans.

Sugar
industry

The volcanic soils are the very best sugar-lands, and a large amount of capital is invested in this industry. The sugar-plantations employ more than forty thousand labor-



HYDRAULIC GOLD MINING—CALIFORNIA

ers, all Japanese, Chinese, and Porto Ricans. About forty million dollars' worth of sugar is produced annually, almost all of which is exported to the refineries of the Pacific Coast States. Fruit, rice, and hides are also important articles of export. Hawaiian pineapples have no superior and they have become the first choice in the American market. Coffee is rapidly becoming a leading product.

Fruit and coffee

Commerce The bulk of the imports comes from the United States, and consists of clothing, cotton textiles, lumber, and machinery.

Honolulu, on the island of Oahu, is the capital and commercial centre, and foreign steamships and sailing-craft are scarcely ever absent from its harbor. Regular steamship service connects this port with San Francisco, Seattle, Vancouver, B. C., and the principal ports of China and Japan. It is connected with the other islands by a system of wireless telegraphy. The city has the best of schools, business organizations, hotels, and streets.

**Com-
mercial
con-
nections**

Pearl Harbor contains a large area of water, most of which is deep enough for the largest vessels afloat. It is intended to deepen the entrance and establish a United States naval station at this place. The village of *Hilo* is the chief port of the island of Hawaii.

**Naval
station**

Area The Philippine Islands are an archipelago of about two thousand islands, the two largest of which, Luzon and Mindanao, are each nearly the size of New York State. Luzon is by far the most important.

After their cession to the United States (December 10, 1898), they were held under military control, but this has given place to local self-government as rapidly as the circumstances permitted. A general school system has been established and is extended wherever practicable. In a considerable number of the islands civil organization is still impossible.

**Organ-
ization**

The following are the principal islands and their mineral resources :

NAME	CHIEF CITIES AND PORTS	MINERAL RESOURCES
Luzon	Manila, Lipa, Batangas	Coal, gold, copper
Mindanao.....	Zamboanga	Coal, gold, copper
Samar	Catbalogan	Coal, gold
Negros	Bacolor	Coal
Panay	Iloilo	Coal, gold, petroleum
Leyte.....	Tacloban	Coal, petroleum
Mindoro	Calapan	Coal, gold
Cebu	Cebu	Coal, petroleum, gold

The native population is mainly of the Malay race, but there are also many Negritos. Of the native element the Tagals are the most advanced, and are the dominant people. The foreign population includes about one hundred thousand Chinese, who are the chief commercial factors of the islands, and the leading industries are controlled by them. There is a considerable population of Chinese and Tagal mixed blood, commonly known as "Chinese mestizos"; they inherit in the main the Chinese characteristics. The European and American population consists mainly of officials, troops, and merchant-agents for Philippine products.

Character
of
population

The principal products for export are "Manila" hemp, and sugar. The hemp is used in the manufacture of cordage and paper. On account of the great strength of the fibre it has no equal among cordage fibres. The imports from the United States consist mainly of machinery and cotton textiles. The total trade of the islands amounted in 1909 to about fifty million dollars, most of which was shared by Great Britain and the United States.

Products
and
commerce

Coal is mined in the island of Cebu and is abundant in

Mineral
resources

most of the islands. Iron ore, copper, and sulphur occur, but they have not been made commercially available to any extent. Gold is mined in the island of Luzon. A stable government only is needed to make these great resources productive. An abundance of timber is found in most of the islands. Cedar, ebony, and sapan-wood are available for ornamental purposes ; there is also a great variety of economic woods.

Timber

Commerce
of Manila

Manila is the commercial centre. Manila Bay is one of the finest harbors in the Pacific Ocean, but much work is necessary to give the water-front a navigable depth for large steamships. With an improved harbor the city is bound to be a great emporium of Oriental trade. Steamship lines connect the city with Hongkong, Australia, Japan, Singapore, and Liverpool. There is also a military transport service to Seattle. A railway to Dagupan extends through the most important agricultural region. The wagon-roads throughout the island are very poor.

Other
com-
mercial
centres

Lipa, *Batangas*, *Bauan*, and *Cavité* are cities of about forty thousand population, all more or less connected with the industries of Manila. *Iloilo* is the second port of importance of the islands, and is the centre of a considerable export trade in tobacco, hemp, sugar, and sapan-wood. *Cebu* is also a port having a considerable trade.

Depend-
encies of
United
States

Tutuila, one of the Samoan Islands, was acquired by treaty for use as a coal-depot and naval station. *Pago Pago*, an excellent land-locked harbor, is a port of call for steamships between San Francisco and Australia. It is also in the line of steamships plying between Australian ports and the Panama Canal. *Guam*, one of the Ladrone Islands, is a naval station. *Midway Island* was occupied by the United States as the best location of a Transpacific cable station. These possessions are strategic and are designed to secure the interests of the United States in the

Pacific. An ocean telegraphic cable connects the Pacific Ocean possessions with the United States and Asia. A small quantity of copra, or dried cocoanut, is exported from several of these islands. Exports

Panama.—The state of Panama was formerly a part of the republic of Colombia. At the time when the Federal government of the United States sought a ratification of the Panama Canal treaty, the intrigues of a transcontinental railway were powerful enough to prevent it. As a result, Panama seceded from Colombia and became an independent state. Geographically, Panama belongs to North America, as it can be reached from Colombia by water only. The treaty between Panama and the United States gives to the latter sovereign control over a strip five miles wide on each side of its canal, called the "Canal Zone." The completion of the canal practically takes the port facilities from the two chief cities, *Panama* and *Colon*. The port of the former is removed to *Port Ancon* or Balboa, and the latter to *Cristobal*, both being within the Canal Zone. The United States exercises police control over Panama and Colon; it owns and operates the railway connecting them. History
Canal zone
Commercial control

The acquisition of this railway put an end to a freight pool that for years had forced much of the transcontinental commerce into the hands of several railways.

Cocoa, coffee, sarsaparilla, crude rubber, and mahogany are exported from Panama. The pearl and turtle fisheries also yield a considerable revenue. Practically all the commerce is carried on with the United States. Exports

QUESTIONS FOR DISCUSSION

Why are mountain regions apt to be sparsely peopled?

Why are arid regions sparsely peopled, as a rule?

Why are not gold-mining settlements so apt to be permanent as agricultural settlements?

From the Abstract of Statistics find the production of gold and silver of this region for each ten years ending the last half of the century.

What causes the difference between the wool clip of southern California and that of the Eastern States ?

Follow the route of a grain-carrying ship from San Francisco to Liverpool.

What are the advantages to the United States of the accession of the Hawaiian Islands ?—of the Philippine Islands ?—of Alaska ? What are the disadvantages ?

FOR COLLATERAL READING AND REFERENCE

Mineral Resources of the United States.

Abstract of Statistics.

U. S. Coast Survey Chart of Alaska.

Map of Hawaiian Islands.

Map of Philippine Islands.



NIAGARA POWER-HOUSE (EXTERIOR)



NIAGARA POWER-HOUSE (INTERIOR)

CHAPTER XXI

CANADA AND NEWFOUNDLAND

Climate
and
topog-
raphy

A VERY large part of Canada is so far north that the ordinary food-stuffs cannot be grown there; the river-valleys of British Columbia and the basin of the Saskatchewan excepted, there are but few marks of human industry beyond the fiftieth parallel. The general conditions of topography resemble those of the United States—a central plain between the high Rocky Mountain ranges in the west and the lower Laurentian ranges in the east.

Agricultural
resources

Canada is an agricultural country, and because of the great skill with which its resources have been made commercially available, it is the most important colony of Great Britain. The basin of the Great Lakes and the St. Lawrence River is the most populous part of the country. This region is highly cultivated and produces dairy products, beef, and the ordinary farm-crops.

Fitness
for wheat-
growing

From Lake Winnipeg westward, nearly to the Rocky Mountains, the land is a succession of prairies admirably suited to wheat-growing.* The wheat is a hard, spring variety, and the average yield per acre is about one-fourth greater than the average yield in the United States.

Forests

The area of forests includes the larger remaining part of the great pine belt, together with a very heavy reserve

* The high latitude of the wheat-region, which in most cases is too cold for the growing of food-stuffs, in this region is tempered by occasional warm winds known as "Chinook winds." These winds are the saving feature of wheat-growing. They prevail also in British Columbia, Washington, and Oregon.

of merchantable oak-timber. The part of the forest area in Canada aggregates one and one-quarter million square miles, and yields an annual product of about eighty million dollars, chiefly of lumber and wood pulp; about one-third of the lumber is exported.

Lumber
product

Most of the spruce is cut in New Brunswick and Nova Scotia and is marketed at the most available ports. The pine lumber is cut mainly along the Ottawa and its tributaries, and in the vicinity of Georgian Bay. The birch lumber comes chiefly down the Saguenay; the Douglas spruce, or "Oregon pine," is obtained on the Pacific coast.

Lumber
regions

The northerly region of Canada produces furs and pelts. As long ago as 1670, Charles II. granted to Prince Rupert and a stock company the lands comprising a very large part of Canada around Hudson Bay, and secured to them the sole right to trap the fur-bearing animals of the region. In time the company, known as the Hudson Bay Company, transferred all its lands to Canada, and out of the domain the various provinces and districts have been created.

Hudson
Bay
Company

The company now exists as a corporation for the merchandise of furs. For the greater part, Indians are employed as hunters and trappers, and the pelts are collected at the various trading-posts, known as "houses" and "factories," to be sent to the head-quarters of the company at Winnipeg. Nearly every Arctic animal furnishes a merchantable pelt. The cheaper skins are made into garments in Canada and the United States; those commonly classed as furs are sold in London. Various other fur companies are also operating in Canada.

"Fac-
tories"

Commerce
of fur
products

The methods of the trade in furs and pelts have changed but little in the past fifty years. The old-fashioned steel trap is still employed in catching the animals; the trapper still conveys his goods and chattels by canoe and portage in summer, and by dog sledges and snow-shoes in winter.

Methods
of fur-
trapping

Trade
centres

Edmonton and *Winnipeg* are the chief outfitting and trading centres of the fur business.

Fisheries

The fisheries of the coast-waters and the Great Lakes are among the most productive in the world. Everything within the three-mile limit of the shore is reserved for Canadian fishermen. The smaller bays and coves are reserved also within the three-mile limit. Beyond this limit the waters are open to all, and a fleet of swift gunboats is necessary to prevent illicit fishing. Salmon, cod, lobsters, and herring form most of the catch, amounting in value to upward of twenty million dollars yearly.

Output
and value
of mineral
products

The output of minerals varies from year to year; since 1900 it has averaged nearly ninety million dollars a year. The gold product constitutes nearly one-fifth and the coal about one-fourth of the total amount. Coal, nickel, petroleum, silver, and lead form the rest of the output. Iron ore is abundant, but only a small quantity is smelted.

Trunk
line
railways

Commerce is facilitated by about twenty-five thousand miles of railway and nearly three thousand miles of canal and improved river-navigation. One ocean-to-ocean railway, the Canadian Pacific, is in operation; another, an extension of the Grand Trunk, is under way. It has the advantage of easy grades, and it shortens the route between interior markets and Liverpool by nearly two days. The rapids and shoals of the St. Lawrence and Richelieu Rivers are overcome by canals and locks. Welland Canal connects Lake Erie and Lake Ontario, and the Canadian lock at St. Marys Falls joins Lake Superior to Lake Huron. By means of the lakes and canals vessels drawing fourteen feet may load at Canadian ports and discharge at Liverpool.

Canals

Hudson
Bay route

A trade route from Winnipeg by way of Hudson Bay to Liverpool is under way, but the difficulties of navigation are very great and the route is open only two months of

the year. The Saskatchewan and Yukon Rivers have a considerable commerce during the summer months.

River
navigation

The harbors of the Atlantic coast have two great drawbacks—ice in winter and high tides all the year. In some ports the docks are built with landings for high and for low tide. Some of the steamship lines make Portland, Me., their winter terminus. The Pacific coast harbors are not obstructed by ice.

Harbors

Practically all the foreign trade is carried on with Great Britain and the United States. The exports are lumber and wood-pulp, cheese and dairy products, wheat and flour, beef-cattle, hog products, fish, and gold-quartz. The chief imports are steel, wool, sugar, and cotton manufactures.

Foreign
commerce

Great Britain admits exports at "preferential," or low duties; with the United States many of the commodities pay no duties at all.

Reciprocal
trade

Politically, Canada consists of a number of provinces, each with the usual corps of elective officers. A governor-general appointed by the Crown of Great Britain is the chief executive officer.

Political
organi-
zation

Nova Scotia.—This province is prominent on account of its coal and iron, and also because of its geographic position. The iron and coal are utilized in steel smelteries and rolling-mills, glass-factories, sugar-refineries, and textile-mills. It is one of the few localities in the eastern part of the continent yielding gold. *Halifax*, the capital, has one of the best harbors of the Atlantic coast of North America; it is not often obstructed by ice, and is the chief winter port. Halifax is the principal British naval station of North America, and this fact adds much to its commercial activity.

Industries

Trade
and trade
centre

Prince Edward Island.—The industries of this province are mainly connected with the coast-fisheries. During the summer the island is visited by thousands of

Industries

fishing-vessels for the purpose of preparing the catch for market. Fertilizer manufactured from the refuse is an incidental product. *Charlottetown* is the capital.

New Brunswick.—Fisheries and forest products are both resources of this province. Coal is mined at *Grand Lake*, and an excellent lime for export to the United States is made at *St. John*. Lumber, wood-pulp, wooden sailing-vessels, cotton textiles, and structural steel for ship-building are manufactured. A ship railway across the isthmus that connects this province to Nova Scotia, is under construction. *St. John* is the chief seat of trade, and rivals *Halifax* as a port of shipment.

Quebec.—This province was once a possession of France, and in the greater part of it French customs are yet about as prevalent as they were a century ago; moreover, the French population is increasing rapidly. The English-speaking population lives mainly along the Vermont border. As a rule the English are the manufacturers and traders; the French people are the farmers.

Montreal is the head of navigation of the St. Lawrence for ocean steamships. It is also the chief centre of manufactures. These are mainly sugar, rubber goods, textiles, light steel wares, and leather. The last-named goes almost wholly to Great Britain; the rest are consumed in Canada and the border American States. *Quebec* is the most strongly fortified city of the Dominion.

Ontario.—This province is a peninsula bordered by Lakes Huron, Erie, and Ontario. Garden and dairy products, fruit, and barley are the chief output. Most of the barley is used in the manufacture of malt, and "Canada malt" is regarded as the best. Several of the trunk railways whose terminals are in the United States traverse this peninsula. *Toronto*, the capital and commercial centre, is one of the most rapidly growing cities of North

America. *Hamilton* owes its existence to its harbor and position at the head of Lake Ontario. *Ottawa* is the capital of the Dominion. At *Sudbury* are the nickel-mines that are among the most productive in the world. *Owen Sound* and *Parry Sound* are Georgian Bay ports.

Nickel
mines

Manitoba, Saskatchewan, and Alberta.—These provinces include the level prairie lands of the Saskatchewan and the Red River of the North. They comprise the great grain-field of Canada. A considerable part of the wheat-growing lands are yet unproductive owing to the lack of railways. Much of the product is carried to market by the Canadian Pacific and its feeders, but a considerable part goes by way of the Northern Pacific and Great Northern roads to *Minneapolis*. The coal of Manitoba and Alberta is an important fuel supply not only to the provinces and States surrounding, but to the railways above named. A good quality of anthracite coal is also mined in Alberta. *Winnipeg*, the metropolis of the region, is one of the great railway centres of Canada.

Wheat-
growing

Coal
product

Com-
mercial
centre

British Columbia.—British Columbia, the Pacific coast province, has several resources of great value. The gold-mines led to its settlement and commercial opening. The salmon-fisheries are surpassed by those of the United States only. The beds of lignite coal have produced a very large part of the coal used in the Pacific coast States. The forests produce lumber for shipment both to the Atlantic coast of America and the Pacific coast of Asia.

Industries

Coal and
forest
products

Vancouver, the terminus of the Canadian Pacific Railway, is connected with various Asian ports by fast steamships. *Nanaimo*, *Wellington*, and *Comox* are the centres of the coal-mining industry. The copper-mines at *Rossland* produce most of the copper mined in Canada.

Trade
centres

Newfoundland.—Although a Crown possession, Newfoundland is not a member of the Dominion of Canada.

Resources

The extensive fisheries are its chief resource. The Labrador coast, which is used as a resort for curing and preserving the catch, is attached to Newfoundland for the purpose of government. *St. Johns* is the capital.

French possessions

The islands of Miquelon and St. Pierre, south of Newfoundland, are a French possession. Fishing is the ostensible industry, but a great deal of smuggling is carried on.

QUESTIONS FOR DISCUSSION

What, if any, climatic or topographic boundaries separate Canada and the United States?

Which of the two countries is the more fortunately situated for the production of food-stuffs?

Which will support the larger population?—why?

The harbors of the Labrador coast and of Cape Breton Island are superior to those of the British Islands, situated in about the same latitude; why do the latter have a commerce far greater than that of the former?

Compare the industries of the eastern, middle, and western regions of Canada with the corresponding regions of the United States.

FOR COLLATERAL REFERENCE

Statesman's Year-Book.

Statistical Year-Book of Canada (official government publication, Ottawa).

CHAPTER XXII

MEXICO—CENTRAL AMERICA—WEST INDIES

MEXICO and the Central American states occupy the narrow, southerly part of North America. Structurally they consist of a plateau about a mile high, bordered on each side by a low coast-plain. The table-land, or *tierra templada*, has about the same climate as southern California; the low coast-plains, or *tierra caliente*, are tropical.

Topography

Climate

Mexico.—The United States of Mexico is the most important part of this group. The people are of mixed Spanish and Indian blood, but there are many families of pure Castilian descent. The latter, in general, are the landed proprietors; the former constitute the tradesmen, herders, and peons. There is also a very large unproductive class, mainly of Indians, who are living in a savage state. In general, the manners and customs are those of Spain.

Character of population

Customs

The agricultural pursuits are in a backward condition, partly for the want of good system and an educated people, but mainly for lack of the capital and engineering skill to construct the irrigating canals that are needed to make the land productive. Maize, rice, sugar (cane and panocha), and wheat are grown for home consumption.

Reasons for backward conditions

The agricultural products which connect Mexico with the rest of the world are sisal-hemp (henequin), coffee, logwood, and fruit. Sisal-hemp is grown in the state of Yucatan, and has become one of its chief financial resources. Oaxaca coffee is usually sold as a "Mocha" berry. The logwood goes mainly to British textile-makers;

Agricultural products for export

Fruit for
export

Cattle

and the fruit, chiefly oranges and bananas, finds a market in the large cities of the United States, to which large consignments of vanilla and tropical woods are also sent. Cattle are grown on more than twenty thousand ranches, and the greater part are sent alive to the markets of the United States. The native long-horn stock is giving place to improved breeds.



Gold and
silver
mining

Value of
bullion:

Gold and silver are the products that have made Mexico famous, and the mines have produced a total of more than three billion dollars' worth of precious metal. The native methods of mining have always been primitive, and low-grade ores have been neglected. In recent years American and European capital has been invested in low-grade mines, and the bullion production has been much increased in value; it is now about eighty million dollars yearly. Iron ore is abundant, and good coal exists.

The manufactures, at present of little importance, are growing rapidly. The cotton-mills consume the home product and fill their deficiency from the Texas crop. All the finer textiles, however, are imported. Most of the commodities are supplied by the United States, Great Britain, and Germany, the first-named having about half the trade. Most of the hardware and machinery is purchased in the United States.

Manu-
factures

Imports

Trade
with
United
States

Within a few years the mines of Cananea, a few miles across the Arizona border, have proved to be rich and of great extent. They are controlled by an American company. There are also rich copper-mines in the northern part of Lower California. Zinc ores occur in several localities and in recent years the output has increased. The famous Mexican opals, valuable chiefly as a lure to tourists, are obtained in Queretaro; opals are also imported from Hungary and Australia for the cupidity of travellers.

Copper

Zinc

Opals

Railway systems, with American terminal points at El Paso, San Antonio, and New Orleans, extend from the most productive parts of the country. One of the most important railways crosses the Isthmus of Tehuantepec, and, in order to encourage commerce, the harbors at *Coatzacoalcos* and *Salina Cruz* have been deepened and improved. This interoceanic route has already become a very important factor in commerce. It shortens the route between European ports and San Francisco by six thousand miles, and between New York and San Francisco by twelve hundred miles. The opening of the line had the effect of materially lowering trans-continental freights from southern points.

Railway
trunk
lines

Mexico, the capital, is the financial and commercial centre. *Vera Cruz* and *Tampico* are connected with the capital by railway, but both have very poor port facilities. Steamship lines connect the former with New York, New Orleans, Havana, and French ports. It is the chief port of the

Com-
mercial
centres

Other
com-
mercial
centres

country. *Matamoros*, on the American frontier, has a considerable cattle-trade. The crop of sisal-hemp is shipped mainly from *Progreso* and *Merida*. *Acapulco*, *Manzanillo*, and *Mazatlan*, for want of railway connections, have but little trade. The first-named is one of the best harbors in the world. *Guadalajara* has important textile and pottery manufactures.

Physical
features

Popu-
lation

Railways

British
Honduras

Resources

The Central American States.—The physical features and climate of these states resemble those of Mexico. The Spanish-speaking people live in the table-lands, where the climate is healthful. The coast-plain of the Atlantic is forest-covered and practically uninhabited save by Indians. Guatemala is the most important state. A railway extends from *Puerto Barrios*, its Atlantic port, through *Guatemala*, to its Pacific port, *San José*. British Honduras is a British territory acquired mainly for the mahogany product, which is shipped from *Belize*. Honduras has great resources in mines, cultivable lands, and forests, but these are undeveloped. Salvador is the smallest but most progressive state.

Political
import-
ance

Nicaragua is politically of importance on account of the possibilities of an interoceanic canal. A treaty for this canal, involving both Nicaragua and Great Britain, is still in effect, notwithstanding the construction of the canal across the Isthmus of Panama. Costa Rica is favorably situated for commerce, but its resources are not developed. A railway from *Puerto Limon* is extended to *Puenta Arenas*, an excellent harbor on the Pacific side.

Export
products

Coffee, hides, mahogany, and fruit are the only products of importance that connect these states with the rest of the world. The cultivation of rubber trees is taking shape, and cattle are grown for the Cuban markets. About half the trade goes to the United States. The Germans and English supply a considerable part of the textiles and

manufactured articles. The coffee of Costa Rica is a very superior product. Much of the mahogany and forest products goes to Great Britain. Fruit-steamers call at the Atlantic ports for bananas, which are sold in New Orleans and the Atlantic cities.

Other
export
products

The instability of government and frequent revolutions are the chief drawbacks to commercial development.

The West Indies.—The West Indies consist of a chain of mountainous islands that geographically are a part of the American continent. Cuba, the largest island, is independent, but is practically under the protectoracy of the United States. Haiti comprises the independent Negro republics of Haiti and Santo Domingo. Porto Rico is a dependency of the United States. The other islands are European possessions, mainly British.

Extent

Political
organi-
zation

The climate and productions of these islands are tropical in character. Sugar, fruit, coffee, tobacco, and cocoa are the leading products. From the stand-point of the planter, the sugar industry has been a history of misfortunes. The abolition of slavery ruined the industry in many of the islands belonging to Great Britain. The competition of the beet-sugar made in Europe drove the Cubans into insurrection on account of the excessive taxes levied by the Spaniards, and ended in the Spanish-American War. Since 1906, however, the business of the sugar planter has been on a fairly safe basis, and the annual export of sugar has been between sixty and seventy million dollars in value. Most of the sugar goes to the refineries in New York and Philadelphia. The forest products are valuable. Some mahogany and a considerable Spanish cedar are exported to the United States. The latter is used for the manufacture of cigar boxes.

Products

Slavery
and the
sugar
industry

Forest
products

The fruit-crop—mainly pineapples, oranges, and grapefruit—is shipped to the United States. New York, Phila-

Fruit
trade

delphia, and the Gulf ports are the destination of the greater part of it.

Cuba is one of the most productive regions of the world. The famous "Havana" tobacco grows mainly in the western part, although practically all Cuban tobacco is classed under this name. According to popular opinion, it is pre-eminently the best in flavor, and the price is not affected by that of other tobaccos.* About two-thirds of the raw leaf and cigars are purchased by the tobacco manufacturers of the United States. *Havana*, *Santiago*, and *Cienfuegos* are the shipping ports; most of the export is landed at New York, Key West, and Tampa.

Cuba and
Havana
tobacco

Com-
mercial
centres

Exports
and
imports

The United States is the chief customer of Cuba, and in turn supplies the Cubans with flour, textile goods, hardware, and coal-oil. Smoked meat from Latin America and preserved fish from Canada and Newfoundland are the remaining imports. There are no manufactures of importance. The railways are mainly for the purpose of handling the sugar-crop.

Com-
mercial
centres

Havana, the capital and financial centre, is connected with New York, New Orleans, and Key West by steamship lines, and with other parts of the island by a good railway system. *Santiago*, *Matanzas*, and *Cienfuegos* are ports having a considerable trade.

Haiti
and its
resources

For want of an efficient government, the rich natural resources of Haiti have not been developed. Logwood, coffee, lignum vitæ, and cocoa are exported. Coffee is cultivated and the quality of the berry is good, but a high export duty prevents extensive cultivation. *Port au Prince* and *Santo Domingo* are the chief commercial outlets. The import trade, chiefly of coal oil and textiles, is mainly with the United States; the exports go chiefly to Europe. (For Porto Rico see p. 263.)

*The entire Cuban crop is comparatively small, being but little more than one-eighth that of the United States.

The British possessions in the West Indies are commercially the most important of the European possessions. Of these Jamaica is the most important, and the island has become a popular winter resort. Its products of fruit, sugar, rum, and ginger are sold mainly in British markets. *Kingston* is its chief port. The Bahamas are low-lying coral islands, producing but little except sponges, fruit, and sisal-hemp. *Nassau*, the only town of importance, is a winter resort. *St. Lucia* has probably the strongest fortress in the Caribbean Sea.

Jamaica

Bahamas

Ports

Barbados produces more sugar than any other British possession in the West Indies. The raw sugar, muscovado, is shipped to the United States. *Bridgetown* is its port. Bermuda, an outlying island, furnishes the Atlantic States with onions, Easter lilies, and early potatoes. From Trinidad is obtained the asphaltum, or natural tar, that is used for street paving. Brea Lake, the source of the mineral, is leased to a New York company. Sugar and cocoa are also exported from *Port of Spain*. The products of St. Vincent and Dominica are similar to those of the other islands.

Barbados

Bermuda

Trinidad

The French own Martinique (*Fort de France*) and Guadeloupe (*Basse Terre*). St. Thomas (*Charlotte Amalie*), St. Croix, and St. John are Danish possessions. Various attempts to transfer the Danish islands to the United States have failed. They are admirably adapted for naval stations.

French
and
Danish
pos-
ses-
sions

QUESTIONS FOR DISCUSSION

What part of the United States was formerly a possession of Mexico, and how did it become a possession of the United States?

From a cyclopedia learn the character of the political organization of Mexico and the Central American states.

From the report listed below find what commercial routes gain

and what ones lose in distance by the Nicaragua, as compared with the Panama canal.

From a good atlas make a list of the islands of the West Indies; name the country to which each belongs, and its exports to the United States.

FOR COLLATERAL READING AND REFERENCE

The Statesman's Year-Book.

Great Canals of the World—pp. 4058-4059.

CHAPTER XXIII

SOUTH AMERICA—THE ANDEAN STATES

IN its general surface features South America resembles North America—that is, a central plain is bordered by low ranges on the east and by a high mountain system on the west. In the southern part, midsummer is in January and midwinter in July. The mineral-producing states are traversed by the ranges of the Andes and all of them except Chile are situated on both slopes of the mountains.

Surface
and
climate

Colombia.—This republic borders both the Caribbean Sea and the Pacific Ocean. One port excepted, however, most of its commerce is confined to the shores of the Caribbean Sea. The lowlands east of the Andes are admirably adapted for grazing, and such cattle products as hides, horns, and tallow are articles of export. This region, however, even with the present facilities for transportation, produces only a small fraction of the products possible.

Surface

The intermontane valleys between the Andean ranges have the climate of the temperate zone; wheat and sheep are produced. The chief industrial development, however, is confined to the lands near the Caribbean coast. Coffee, cacao, and tobacco are grown for export, the business of cultivation being largely controlled by Americans and Europeans. Rubber, copaiba, tolu, and vegetable ivory* are gathered by Indians from the forests.

Climate

Industries

Forest
products

The montane region has long been famous for its mines of gold and silver. The salt mines near Bogota are a gov-

Mineral
products

*Vegetable ivory is the seed or nut of a species of palm (*Phytelephas macrocarpa*). The kernel of the nut gradually acquires the hardness and appearance of the best ivory. It is used chiefly in making buttons.



ernment monopoly and are the chief source of government revenue. Near the same city are the famous emerald mines of Muzo and Coscuez. They yield uncut stones to the value of about one million dollars yearly. Coal and petroleum are abundant, but the deposits are not worked; indeed, coal oil is one of the principal imports.

Mineral
resources

The rivers are the chief channels of internal trade. During the rainy season steamboats ascend the Orinoco to *La Dorada*, about six hundred miles from its mouth. The Cauca has about two hundred miles of navigable waters. About fifty steamboats are in commission on the Magdalena and its tributary, the Cauca. Mule trains traversing wretched trails require from one to two weeks to transport the goods from the river landings to the chief centres of population. Improvements now under way in clearing and canalizing these rivers will add about five hundred miles of additional waterway. The railways consist of short lines mainly used as portages around obstructions of the rivers. In 1910 there were less than five hundred miles of railway.

Rivers
the chief
trade
routes

Pack
trains

Railways

An unstable government and an onerous system of export taxes hamper trade. Coffee, a leading product, goes chiefly to Europe. Cattle products, and balsam of tolu are purchased mainly in the United States. Great Britain purchases the gold and silver ores. The chief imports—textiles, flour, and petroleum—are purchased in the United States. *Bogota* and *Medellin* are the largest cities. The isolation of the region in which they are situated shapes the indifferent foreign policy of the government. *Barranquilla*, *Sabanilla*, and *Cartagena* are the chief ports.

Trade
exactions

Commer-
cial
products

Trade
centres

Peru.—Peru has great resources, both agricultural and mineral. Cotton is one of the chief products. The ordinary fibre is excelled only by the sea-island cotton of the United States; the long-staple fibre of the Piura is the

Kinds of
cotton



A PASS IN THE ANDES

best grown. The former is generally employed for mixing with wool in the manufacture of underwear, and is sold in the United States and Europe; the latter, used in the manufacture of thread and the web of pneumatic tires, goes mainly to Great Britain. Uses

Cane-sugar is a very large export crop, Great Britain, the United States, and Chile being the principal customers. The area of coffee production is growing rapidly. Cocagrowing has become an important industry, and the plantations aggregate about three million trees;* a large part of the product is sent to the chemical laboratories of the United States. A small crop of rice for export is grown on the coast. Other agricultural products

The Amazon forest products yield a considerable revenue. Rubber and vegetable ivory are the most valuable. Cinchona, or Peruvian bark, however, is the one for which the state is best known; and there is probably not a drugshop in the civilized world that does not carry it in stock.† Forest products

Cattle are grown for their hides, and these are sold in the United States. The wool of the llama, alpaca, and vicuña is used in manufacture of the cloth known as mohair, of which Great Britain is the chief purchaser. In Cattle products

* The leaves of this shrub (*Erythroxylon coca*) contain a stimulant substance that in its effects is much like the active principle of coffee. They are much used by the native laborers to ward off the feeling of lassitude that comes with severe labor in a tropical climate. A native porter will carry a load of one hundred pounds a distance of sixty miles with no food or rest, but merely chewing a few coca-leaves. The plant yields the substance *cocaine*, now in demand all over the world as an anæsthetic in eye and throat surgery. Coca and its uses

† More than a score of species of the tree from which this bark is obtained grow in the higher eastern slopes of the Andes, but a very large part is obtained from the tree, *Cinchona calisaya*. The medicinal substance, quinine, is extracted from the bark, and in the past half-century it has become the specific for malarial fevers. So great is the demand for it, that the cinchona-tree is now cultivated in India, Java, and Mexico. Cinchona

the mining regions the llama is used as a pack-animal, and a large part of the mine products reaches the markets by this means of transportation. The mines yield gold, silver, and copper; most of the ores are exported to Great Britain. Petroleum is obtained near *Payta*.

The products already named are the chief exports; the imports are cotton textiles, machinery, steel wares, and coal-oil. Great Britain has about one-half the foreign trade; the United States controls about one-fourth. *Callao*, the port of *Lima*, is the market through which most of the foreign trade is carried on. Steamship lines connect it with San Francisco and with British ports. *Mollendo* is the outlet of Bolivian trade. About fifteen hundred miles of railway are in operation. *Iquitos*, reached by steamships on the Amazon, is the outlet of the rubber and chincona trade.

Ecuador.—This state has but little commercial importance. The only cultivated products for export are cocoa, coffee, and sugar. The first-named constitutes three-fourths of the exports. The commerce of it is controlled mainly by German companies, and most of the product goes to France. The land is held in large estates, and most of the laboring people are in a condition of practical slavery. The bread-stuffs consumed by the foreign population and the land proprietors are imported. Animals are grown for their hides and these are sold to the United States.

Another manufacture that connects Ecuador with the rest of the world is the so-called "Panama" hat. The material used is toquilla straw, the mid-rib of the screw-pine (*Carlodovica palmata*). The prepared straw can be plaited only when the atmosphere is very moist, and much of the work is done at night. The hats are made by Indians, who are governed by their own ideas regarding styles and shapes. They bring prices as high as fifty

Mineral
products

Exports
and
imports

Commer-
cial
centres

Railways

Commer-
cial
products

Land
tenure

Imports

Exports

Panama
hats

dollars apiece in the American markets, where nearly all the product is sold.*

Mule paths are the only means of inland communication. There is a considerable local traffic on the estuaries of the rivers, but this is confined to the rainy seasons. A railway built by an American company is in operation from *Guayaquil* to *Quito*. The former city is the chief market for foreign goods, and it is the only foreign port of the Pacific coast of South America in which the volume of trade of the United States approximates that of Germany and Great Britain.

Transportation facilities

Trade centres

Bolivia.—Bolivia lost much of its possible commercial future when, after a disastrous war, its Pacific coast frontage became a possession of Chile. The agricultural lands are situated unfortunately with reference to the mining population; as a result, a considerable amount of food-stuffs must be imported from Argentina. Coffee, cocoa, and coca are the principal cultivated products. Rubber from the Amazon forest is the most valuable vegetable product, but a considerable amount of cinchona bark and ivory nuts is also exported.

Situation of mining and agricultural lands

Commercial products

The mines, however, are the chief wealth of the state and give it the only excuse for its political existence. They produce silver, tin, copper, gold, and borate of lime. Inasmuch as a large part of the ore and ore products must be transported by llamas and mules, only the richest mines can be profitably worked. With adequate means of transportation, the mines should make Bolivia one of the most powerful South American states.

Mineral wealth

Railways already connect *Oruro* with the sea-coast. A railway now under construction will connect *La Paz* (the

Railways

*Not all the Panama hats in the market are genuine. Most of the imitations, which sell at retail for five dollars or more apiece, are serviceable hats.

"peace," or treaty of Ayacucho) with the Pacific coast, and also Buenos Aires. Excellent roads to take the place of the pack-trains are under construction.

Commerce Practically all the imports, consisting of cotton and woollen textiles, machinery, and steel wares, are purchased in Great Britain. The exports are more than double the imports. Most of the goods pass through the Chilean port *Arica*, or *Mollendo*, Peru. *La Paz*, *Oruro*, and *Sucre* are the chief cities.

Trade centres

Rubber production The area forming the angle where Bolivia, Peru, and Brazil join is a very productive rubber region. This area, formerly the insurrectionary state of Acre, is now under a stable government, but the ownership of the region is still in dispute. The rubber forests, together with the absence of legal government, led to its existence. The government is wholly insurrectionary, but it at least uses its powers to encourage the rubber trade.

Extent **Chile.**—This state comprises the narrow western slope of the Andes, extending from the tropic of Capricorn to Cape Horn, a distance of about three thousand miles.

Resources The resources of the state have been so skilfully handled that, with the drawback of a very small proportion of cultivable land, Chile is the foremost Andean state.

Situation of cultivable lands The cultivation of the ordinary crops is confined to the flood-plains of the short rivers. These, as a rule, are from twenty to fifty miles long and a mile or two in width. They are densely peopled and cultivated to the limit. Between the river-valleys are long stretches of unproductive land.

Agricultural products Within the valleys wheat, barley, fruit, and various food-stuffs are grown. Of these there are not only enough for home consumption, but considerable quantities are exported to Bolivia, Peru, and Ecuador. Much of the cultivable land requires to be watered, and the system of

irrigation has been developed with extraordinary skill. The grazing lands are extensive. In the northern part an excellent quality of merino wool is produced; the greater part of the clip, however, is an ordinary fibre. The cattle furnish a considerable amount of leather for export.

Cattle
products

The conditions which have made the northern part a desert have also given to the state its greatest resource—nitre.* The nitrate occurs in the northern desert region. The crude salt is crushed and partly refined at the mines, and carried by rail to the nearest port. The working of the nitrate beds is largely carried on by foreign companies. Nearly all the product is used as a fertilizer in Germany, France, and Great Britain. Nitrate constitutes about six-sevenths of the exports. Iodine and bromine are also obtained from the nitrates, and the Chilean product yields nearly all the world's supply.

Chief
mineral
wealth

By-
products

Copper is extensively mined and, next to the nitrates, is the most valuable product. Great Britain is the customer for the greater part. Coal occurs in the southern part of the state, and is mined for export to the various states of the Pacific coast. It is not a good coal for iron smelting, however, and about three times as much is imported as is exported. A considerable part of the imported coal comes from Australia, and with it structural steel is made from pig-iron that is also imported.

Coal

Chile is well equipped with railways, a part of which has been built and is operated by the state. The most important line traverses the valley between the Andes and the coast ranges, from Concepcion to Valparaiso. The railways aggregate about thirty-five hundred miles. In

Railways

* Nitre, or "nitrate," is a native nitrate of potash, or nitrate of soda. The latter, commonly called cubic nitre or Chile saltpetre, is the kind occurring in Chile. Inasmuch as it is very soluble, a plentiful rainfall would soon leach it from the ground and carry it to the sea. The nitrate is thought to be of a vegetable origin.

Nitrates

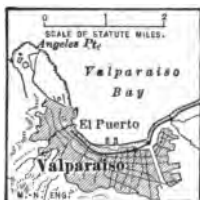
Modern
improve-
ments

this region are most of the manufacturing enterprises. The larger cities are well equipped with electric railways, telephone centres, and wireless telegraph systems.

Commerce

The imports are chiefly coal, machinery, textile goods, and sugar. The British control about two-thirds of the foreign trade; the Germans and the French have most of the remainder. The United States supplies the Chileans with a part of the textiles, a considerable quantity of Oregon pine, and practically all the coal-oil used.

Trade
centres



Economy
of
Trans-
andine
Railway

Valparaíso is the chief business centre of the Pacific coast of South America. Most of the forwarding business is carried on by British and German merchants. The Transandine Railway, now completed, makes it one of the most important ports of the world. Ten days in time and one hundred dollars in passage money are saved by this route, between Valparaíso and Buenos Aires. About eighty steamships are regularly in trade with this port. *Santiago* is the capital. *Concepción* and *Talca* are important centres of trade. *Chillán* is the principal cattle-market of the Pacific coast of South America. *Copiapo* is the focal point of the mining interests. *Iquique* is the port from which about all the nitrates are shipped. *Punta Arenas*, one of the "end towns" of the world, is an ocean post-office for vessels passing through the Straits of Magellan. It is about as far south as Calgary, B. C., is north.

Other
trade
centres

QUESTIONS FOR DISCUSSION

What will be the probable effect of an interoceanic canal on the commerce of these states?

From the Abstract of Statistics make a list of the exports from the United States to these countries.

From the statistics of trade in the Statesman's Year-Book compare the trade of the United States with that of other countries in these states.

How have race characteristics affected the commerce and development of these states?

What is meant by peonage?

What cities of the tropical part of these states are in the climate of the temperate zone?

FOR COLLATERAL READING AND REFERENCE

Carpenter's South America.

Vincent's Around and About South America.

Fiske's Discovery of America—Chapters IX-X.

Procure, if possible, specimens of the following: Cocoa products, ivory nuts, cinchona bark, crude nitrate, Panama straw, iodine (in a sealed vial), llama wool, alpaca cloth, Peruvian cotton.

CHAPTER XXIV

SOUTH AMERICA—THE LOWLAND STATES

Character of surface THE eastern countries of South America are mainly low-land plains. The llanos of the Orinoco and the pampas of Plate (La Plata) River are grazing lands. The silvas of the Amazon are forest-covered. In tropical regions the coast-plain is usually very unhealthful; the seaports excepted, most of the cities and towns are therefore built on higher land beyond the coast-plain.

Surface **Venezuela.**—The greater part of Venezuela is a region of llanos, or grassy plains, shut off from the harbors of the Caribbean Sea, by mountain-ranges. On account of their pleasant climate the mountain-valleys constitute the chief region of habitation. The plains are flooded in the rainy season and sun-scorched during the period of drought; they are therefore unfit for human habitation.

Climate Coffee is cultivated in the montane region; and cocoa in the lower coast lands. Almost every part of the coast low-lands is fit for sugar cultivation, and in order to encourage this industry, the importation of sugar is forbidden. As is usual in similar cases, the domestic sugar is poor in quality and high in price. Among the forest products rubber, fustic, divi-divi,* and tonka beans, the last used as a perfume, are the only ones of value. The cattle of the llanos, the native long-horns, furnish a poor quality of hide, and poorer beef. A few thousand head are shipped yearly down the Orinoco to be sent to Cuba and Porto Rico.

Agricultural products Cattle products

* The pod of a shrub (*Cesalpinia coriaria*); it contains a considerable proportion of tannin and is used for tanning leather.

The placer gold-mines of the Yuruari country, a region also claimed by Great Britain, have been very productive. Coal, iron ore, and asphaltum are abundant. Concessions for mining the two last-named have been granted to American companies. The pearl-fisheries around Margarita Island, also leased to a foreign company, have become productive under the new management.

Mineral resources

Pearl-fisheries

The means of intercommunication are as primitive as those of Colombia. Short railways extend from several seaports to the regions of production, and from these coffee and cocoa are the only exports of importance. The coffee goes mainly to the United States, the cocoa to France. The Orinoco River is the natural outlet for the cattle-region, but the commerce of this region is small. The lagoon of Maracaibo is the centre of a great commercial region.

Transportation facilities

Exports

Caracas, the capital and largest city, receives the imports of textiles, domestic wares, flour, and petroleum from the United States and Great Britain. The railway to its port, *La Guaira*, is a remarkable work of engineering. *Puerto Cabello*, the most important port, receives the trade of *Valencia*. From *Maracaibo*, the port on the lagoon of the same name, is shipped the Venezuelan coffee. *Ciudad Bolivar* is the river-port of the Orinoco and an important rubber-market.

Trade centres

The Guianas.—The surface conditions and climate of the Guianas resemble those of Venezuela. The native products are also much the same, but good business organization has made the countries bearing the general name highly productive. For the greater part, the coast-plain is the region of cultivation. Sugar is still the most important crop; but on account of the fierce competition of beet-sugar, on many of the plantations cane-sugar cultivation is unprofitable and has been abandoned for that of rice, cocoa, and tobacco. Great Britain, Holland, and France

Agricultural products



A CACAO PLANTATION



PREPARING THE BEANS FOR SHIPMENT



CACAO-TREE



MAKING CHOCOLATE

possess the country. The divisions are known respectively as British Guiana, Surinam, and Cayenne, and the trade of each accrues to the mother-country. Sugar is the chief product, and about one-third of the population is concerned in this industry. British Guiana is noted quite as much for the gold-fields of the Cuyuni River on the Venezuelan border as for its agricultural products. Diamonds occur, and the yield, although small, is increasing. *Georgetown*, better known by the name of the surrounding district, *Demerara*, is the focal point of business. *New Amsterdam* is also a port of considerable trade. The gold-mining interests centre at *Bartica*.

Political divisions

Products

Trade centres

Surinam, in addition to its export of sugar, coffee, rice, and bananas, contains rich gold-mines, and these contribute a considerable revenue. *Paramaribo* is the port and centre of trade. Phosphates and gold are among the exports of *Cayenne*, the chief port and market of the colony.

Mineral resources and trade centres

Brazil.—This state, nearly the size of the United States, comprises about half the area of South America. Much of it, including the greater part of the Amazon River basin, is unfit for the growth of food-stuffs.

Extent

There are three regions of production. The Amazon forests yield the greater part of the world's rubber supply. The middle coast region has various agricultural products, of which cotton and cane-sugar are the most important. From the southern region comes two-thirds of the world's coffee-crop. There are productive gold-mines in Ouro Preto. Diamonds, however, are the mineral product for which Brazil has long been noted. The best, known as "old mine" stones, are found, now rarely, in Minas Geraes. Rock crystal, the "Brazilian pebble glass" used in lenses, is a product peculiar to the country; and so also is monazite, a mineral used in making the mantles of incandescent gas lights.

Regions of production

Mineral products

Rubber-
producing
lands

Disposi-
tion of
rubber
crop

Cotton
industry

Sugar
industry

Other
exports

Coffee
industry

Cattle
products

The Amazon rubber-crop includes not only the crude gum obtained in Brazil, but a considerable part, if not the most, of the crop from the surrounding states. The bifurcating Cassiquiare, which flows both into Amazonian and Orinocan waters, drains a very large area of forest which yields the best rubber known. The exports in 1909 were about eighty million pounds, about half the amount exported in 1901. Of this, the greater part was sold in the United States, about one-fourth going to Liverpool. The price of rubber is fixed in New York and London.

The cotton and sugar-cane are grown in the middle coast region. The cotton industry bids fair to add materially to the prosperity of the state. A considerable part of the raw cotton is exported, but the reserve is sufficient to keep ten thousand looms busy. About one hundred and fifty million pounds of sugar are exported, of which the refineries of the United States are the chief purchasers. Paraguay tea is extensively grown.

The seeds of a species of myrtle (*Bertholletia excelsa*) furnish the Brazil nuts of commerce, large quantities of which are shipped to Europe and the United States.* Manganese ore is also an important export, and Great Britain purchases nearly all of it.

The coffee-crop of the southern states is the largest in the world; and about one billion pounds are landed yearly at the ports of the United States. The coffee-crop, more than any other factor, has made the great prosperity of the state; for while the rubber industry employs comparatively few men and yields but little public revenue, the coffee-crop has brought into Brazil about fifty million dollars a year for three-quarters of a century.

Cattle products also afford a considerable profit in the vicinity of the coffee-region. The hides and tallow are

*The pericarp or pod contains about twenty-four prismatic-shaped nuts.

shipped to the United States. For want of refrigerating facilities, most of the beef is "jerked," or sun-dried, and shipped in this form to Cuba.

The facilities for transportation, the rivers excepted, are poor. The Amazon is navigable for ocean steamships nearly to the junction of the Ucayale. The Paraguay affords a navigable waterway to the mouth of Plate River. Rapids and falls obstruct most of the rivers at the junction of the Brazilian plateau and the low plains, but these streams afford several thousand miles of navigable waters both above and below the falls.

Navigable
rivers

Nearly all the railways are plantation roads, extending from the various ports to regions of production a few miles inland. The most important railway development is that in the vicinity of Rio, where short local roads to the suburban settlements and the coffee-plantations converge at the harbor. About fourteen thousand miles of railway are completed and under actual construction. A considerable part of the mileage is owned and operated by the state, and it has become the policy of the latter to control its roads and to encourage immigration. One result of this policy is the increasing number of German and Italian colonies, that establish settlements in every district penetrated by a new road.

Railways

State
policy

In 1909 the total export trade aggregated upward of three hundred million dollars. The imports consist of cotton and woollen manufactures, structural steel and machinery, preserved fish and meats, and coal-oil. Great Britain, Germany, the United States, and France have nearly all the trade. The United States sells to Brazil textiles and coal-oil to the amount of over twenty million dollars yearly, and buys of the country coffee and rubber to the amount of four times as much.

Foreign
trade

Rio de Janeiro, commonly called "Rio," is the capital

Trade
centres

and commercial centre. Its harbor is one of the best in South America. Formerly all the coffee was shipped from this port, but the greater part now goes from *Santos*. *Porto Alegre*, the port of the German colonies, has also a growing export trade.

Other
trade
centres

Bahia, *Pernambuco* (or *Recife*), *Maceio*, and *Ceará* are the markets for cotton, sugar, and tobacco, much of which is shipped to other Brazilian ports for home consumption. *Para* and *Ceará* monopolize nearly all the rubber trade. The position of *Manaos*, at the confluence of several rivers, makes it one of the most important markets of the Amazon basin, and most of the crude rubber is first collected there for shipment. *Cuyaba* is the commercial centre of the mining region; its outlet is the Paraguay River, and Buenos Aires profits by its trade.

Compara-
tive
position

Argentina and the Plate River Countries.—These states are situated in a latitude corresponding to that of the United States. The entire area from the coast to the slopes of the Andes is a vast plain, a considerable part being forest-covered. As a result of position, climate, and surface the agricultural industries are the same as in the United States—grazing and wheat-growing.

Cattle
industry

Cattle-growing is the chief employment, and the cost of rearing stock is not more than a few cents per head. For want of better means of transportation the shipments of live beef are not very heavy; the quality of the beef is being improved by cross-breeding. Until recently there have been no adequate facilities for getting it to market.* Refrigerator beef and a large amount of jerked beef are

* The cattle for Cuba and Brazil must be shipped in open pens in crossing the tropics. With the exports for Europe the case is different. If it is summer at the one port it is winter at the other, but it is always summer in the tropics, and cattle-ships fit for one zone are not fit for the other—hence the great difficulties in shipment of live animals to Europe.

exported. Near the markets are large plants in which the hides, horns, tallow, and meat are utilized—the last being converted to “beef extract.”

Cattle
products

The sheep industry is on a much better business basis. Both the wool and the mutton have been improved by cross-breeding with good stock. As a result, the trade in mutton and wool has increased by leaps and bounds; and a large amount of mutton is landed at the ports of Brazil, Cuba, and Europe. The wool is bought mainly by Germany and France, but the United States is a heavy purchaser. The quality of the fibre, formerly very poor, year by year is improving.

Sheep
industry

Wool

Wheat, the staple product, is grown mainly within a radius of four hundred miles around the mouth of Plate River. The area of cultivation is increasing as the facilities for transportation are extended and, little by little, is encroaching on the grazing lands. The wheat industry is carried on very largely by German and Italian colonists. Flax, grown for the seed, is a very large export crop. Maize, partly for export and partly for home consumption, is also grown.

Wheat
growing

Flax and
maize

The timber resources, chiefly in Paraguay and the Gran Chaco, are very great, but for want of means of transportation the timber-trade cannot successfully compete with that of Central America and Mexico. Quebracho, used in tanning, is exported in logs. Gold, silver, and copper are exported to Europe. A poor quality of lignite occurs in several provinces, but there are no mines yielding good steam coal. There are petroleum wells near *Mendoza*.

Timber
product

Mineral
products

Most of the manufactures pertain to the preparation of cattle products, although a considerable amount of coarse textiles are made in the larger cities from the native cotton and wool. Hats, paper (made from grass), and leather goods are also made. In general, all manufactures are

Manu-
factures

hampered by the difficulties of getting good fuel at a low price.

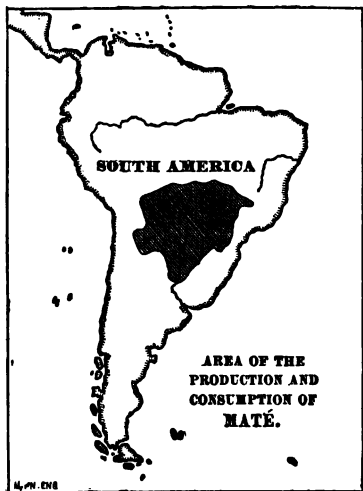
Trans-
portation

Transportation is carried on along Plate River and the lower parts of its tributaries. The railway has become the chief factor in the carriage of commodities, however, and the railways of Argentina have been developed on the plans of North American roads. About seventeen thousand miles are in actual operation, one line of which, the Transandine, is a trans-continental line between Buenos Aires and Valparaiso. Electric railways have become very popular, and the mileage is rapidly increasing.

Railways

Foreign
trade

The import trade, consisting of textile goods, machinery, steel, and petroleum, is carried on with Great Britain, France, Germany, Belgium (mainly transit trade), the United States, and Italy. The competition between



Education
system

the European states for this trade is great, and not a little has been acquired at the expense of the United States. Argentina is the most progressive South American state, and a fine educational system as a foundation for the future has been organized.

Trade
centres

Buenos Aires is the financial centre of this part of South America. Among its industries is the largest meat-refrigerating plant in the world. The harbor at *La Plata* is excellent and has drawn a considerable part of the foreign trade from Buenos Aires. *Rosario*, *Tucuman*, *Cordoba*,

Bahia Blanca, *Santa Fé*, and *Parana* are the markets of extensive farming regions. *Mendoza* is the focal point of the mining interests.

Paraguay has a large forest area, but for want of means of transportation it is without value. Even the railway companies find it cheaper to buy their ties in the United States and Australia, rather than to procure them in Paraguay. In spite of the extent of good land, the wheat and much of the bread-stuffs are purchased from Argentina. Tobacco and maté are the only export crops. The Parana and Paraguay Rivers are the chief commercial outlet of the state.

Resources

Uruguay, owing to its foreign population, is becoming a rich country. The native cattle have been improved by cross-breeding with European stock, and the state has become one of the foremost cattle and sheep ranges of the world. These go mainly to Europe, as also does the wheat-crop.

Industries

France and Argentina purchase most of the exports, and Great Britain supplies most of the textiles and machinery imported. The trade of the United States is about one-fourth that of Great Britain. *Montevideo* is the chief market and port. At *Fray Bentos* is one of the largest plants in the world for the manufacture of cattle products.

Trade centres

QUESTIONS FOR DISCUSSION

What kind of commerce has led to the establishment of the various ports along the Spanish Main?

What advantages has the American fruit-shipper, trading at South American ports, over his European competitor?

What is meant by "horse latitudes," and what was the origin of the name?

In what way may the opening of an interoceanic canal affect the coffee-trade of Brazil?—the nitrate trade of Chile?

FOR COLLATERAL READING AND REFERENCE

From the Abstract of Statistics find the exports of the United States to each of these countries.

If possible, obtain specimens of the following: Crude rubber, pampas grass, Brazil nuts (in pod), and raw coffee of several grades for comparison with Java and Mocha coffees.

CHAPTER XXV

EUROPE—GREAT BRITAIN AND GERMANY

ALMOST all the commercial activity of Europe is south of the parallel and west of the meridian of St. Petersburg. Most of the great industries are controlled by Germanic and Latin peoples, and among these Great Britain and Germany stand first.

Location
of com-
mercial
activities

Great Britain and Ireland.—The United Kingdom, or Great Britain and Ireland, are commonly known as the British Isles. The British Empire consists of the United Kingdom and its colonial possessions; it includes also a large number of islands occupied as coaling-stations and for strategic purposes. All told, the empire embraces about one-seventh of the land area of the world and about one-fourth its population.

Extent of
British
Empire

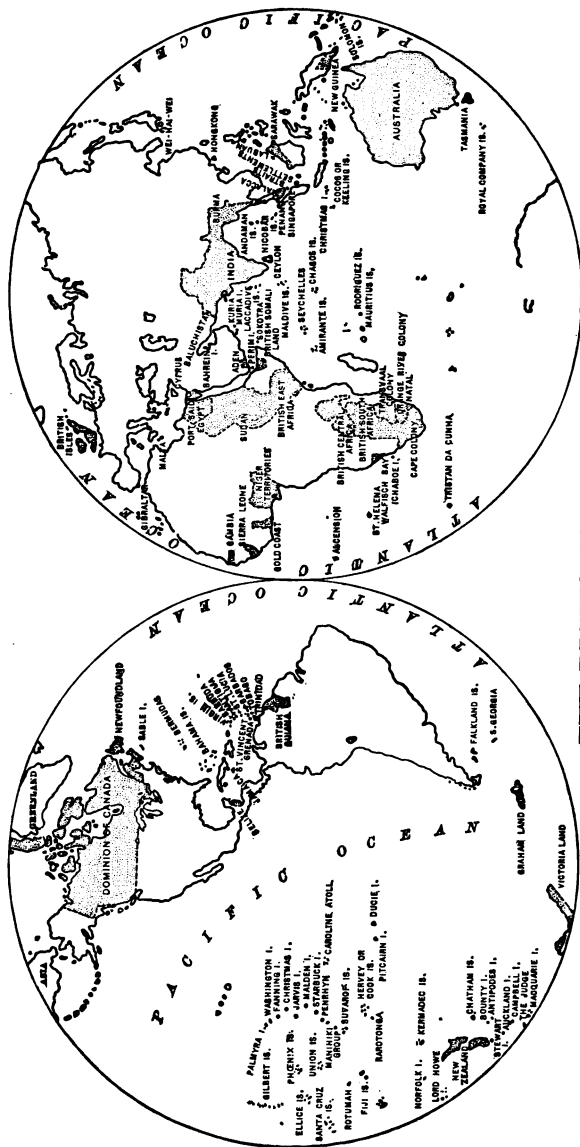
The wonderful power and great commercial development is due not only to conditions of geographic environment but also to the intelligence of a people who have adjusted themselves to those conditions. The insular position of the United Kingdom has given it natural protection, and for more than eight hundred years there has been no successful invasion by a foreign power. Its commercial position is both natural and artificial. It has utilized the markets to the east and south, and has founded great countries which it supplies with manufactured products.

Reasons
for com-
mercial
develop-
ment

Results of
insular
position

The position of the kingdom with respect to climate is fortunate. The movement of the Gulf Stream on the American coast carries a large volume of water into the latitude

Causes
of mild
climate



THE BRITISH EMPIRE.

of the prevailing westerly winds, and these in turn carry warm water to every part of the coast of the islands. As a result, the harbors of the latter are never obstructed by ice; those of the Labrador coast, situated in the same latitude, are blocked nearly half the year.

Effects of
warm
ocean
currents

The high latitude of the islands is an advantage so far as the production of food-stuffs is concerned. The summer days in the latitude of Liverpool are very nearly eighteen hours in length, and this fact together with the mild winters, adds very largely to the food-producing power of the islands.

Effects
of high
latitude

The highlands afford considerable grazing. Great care is taken in improving the stock, both of cattle and sheep. In the north the cattle are bred mainly as meat producers; in the south for dairy products. Durham, Alderney, and Jersey stock are exported to both Americas for breeding purposes. The sheep of the highlands produce the heavy, coarse wool of which the well known "cheviot" and "frieze" textiles are made. Elsewhere they are bred for mutton, of which the "South Down" variety is an example.

Cattle
growing

Sheep
growing

The lowland regions yield grain abundantly where cultivated. The average yield per acre is about double that of the United States, and is surpassed by that of Denmark only. Both Ireland and England are famous for fine dairy products. These are becoming the chief resource of the former country, which is practically without the coal necessary for extensive manufacture. The fishing-grounds yield an annual value of about fifty million dollars.

Grain
growing

Dairy
products

Fisheries

The cultivated lands do not supply the food needed for consumption. The grain-crop lasts scarcely three months; the meat-crop but little longer. Bread-stuffs from the United States and India, and meats from the United States, Australia, and New Zealand make up the shortage.

Deficiency
of food
products

The annual importation of food-stuffs amounts to not far from fifty dollars per capita.

Beginning
of textile
industry

The growing of wool and flax for cloth-making became an industry of great importance just after the accession of Henry VII. With the advent of peace, it became possible to manufacture into cloth the fibres that before had been sent for that purpose to Flanders. The utilization of the coal and the iron ore years afterward brought about an economic revolution that was intensified by the invention of the steam-engine and the power-loom.

Effects of
manu-
factures

These quickly brought the country into the foremost rank as a manufacturing centre. Moreover, they also demanded the foreign markets that have made the country a maritime power as well—for an insular country must also have the ships with which to carry its merchandise to its markets, and also the navy to protect them.

Develop-
ment of
metal
industries

The development of the manufactures, therefore, is inseparably connected with that of the mineral and metal industries. From very early times the metal deposits of the country have been a source of power. Copper and tin were used by the aboriginal Britons long before Cæsar's reconnaissance of the islands, and it is not unlikely that the Bronze Period was the natural development that resulted from the discovery of these metals.

Coal

Coal occurs in various fields that extend from the River Clyde to the River Severn. The output of these mines in 1909 was about two hundred and sixty-five million tons. In the past century the inroads upon the visible supply were so great that the output in the near future will be considerably lessened. Not far from one-fifth of the output is sold to consumers in France, Italy, and Germany, but a growing sentiment to forbid any sale of coal to foreign buyers is taking shape.

Iron ores are fairly abundant, but the hematite required



Steel
manu-
facture

Dependent
manu-
factures

Import
trade

Textile
materials
imported

for the best Bessemer steel is limited to the region about Manchester and Birmingham. The shortage of this ore has become so apparent within recent years that Great Britain has become a heavy purchaser of ores in foreign markets. The coal in the Clyde basin is employed mainly in the manufacture of railway iron, steamship material, and rolling stock. The manufacture of structural steel is gradually moving to the vicinity of South Wales, at the ports of which foreign pig-iron can be most cheaply landed. In west-central England the several coal-fields form a centre of manufacture, where are located the woollen and cotton mills, and also the plants for the manufacture of machinery, cutlery, and pottery.

The import trade of Great Britain consists mainly of food-stuffs and raw materials.* Of the latter, cotton is by far the most important. Most of it comes from the United States, but the Nile delta, Brazil, the Dekkan of India, the Iran plateau, and the Piura Valley of Peru send portions, each region having fibre of specific qualities designed for specific uses. The native wool clip forms only a small part of the amount required for manufactures. The remainder comes from Australia, New Zealand, and South Africa.

The supply of flax is small, and the deficit is imported to meet the wants of the mills. The greater part is purchased in Russia, but the finer quality is imported from Belgium. Jute is purchased from India and manufactured into burlap and rugs.

But little available standing timber remains, and lumber must, therefore, be imported. The pine is purchased mainly

* Great Britain is practically a free-trade country. A protective tariff on imported food-stuffs and raw materials would hurt rather than protect British industries. Nevertheless, the tremendous expenditures for war purposes are gradually forcing the adoption of an import tariff.

in Sweden, Norway, Canada, and the United States. A considerable amount of wood-pulp is imported from Canada for paper-making. Mahogany for ornamental manufactures is obtained from Africa and British Honduras. Oak, and the woods for interior finish, are purchased largely from Canada and the United States.

Lumber
imports

The export trade of Great Britain consists almost wholly of the articles manufactured with British coal as the power. These are made from the raw materials purchased abroad, and the stamp of the British craftsman is a guarantee of excellence and honest workmanship. Of the total export trade, in 1909, nearly one billion nine hundred million dollars, about one-third consists of cotton, woollen, linen, and jute textiles; one-fifth consists of iron and steel manufactured stuffs made from British ores. About one-third goes to the colonies of the mother-country; Germany, the United States, and the South American states are the chief foreign buyers.

Export
trade

For the handling and carriage of these goods there is an admirable system of railways reaching from every part of the interior to the numerous ports. The rolling stock and the locomotives are not nearly so heavy as those used in the United States; the railway beds and track equipment, on the whole, are probably the best in the world. Freight rates are considerably higher than on the corresponding classes of merchandise in the United States, due to the shortness of the haul. The public highways are most excellent, and the electric railway and gasoline automobiles have supplanted the 'bus.

Railway
and other
transportation

The harbor facilities at the various ports are of the best. The docks and basins are usually arranged so that while the import goods are being landed the export stuffs are made ready to be loaded. The facilities for the rapid transfer of freights have been improved by the reconstruc-

Facilities
for
commerce

Harbor
improvements

tion of the various river estuaries so as to make them ship-channels. The estuaries of the Clyde, Tyne, and Mersey have been thus improved, while Manchester has been made a seaport by an artificial canal. The British merchant marine is the largest in the world, and about ninety per cent. of the vessels are steamships.

Commerce
of London

London is the capital; it is also one of the first commercial and financial centres of the world. The Thames has not a sufficient depth of water for the largest liners, and these dock usually about twenty miles below the city. The colonial commerce at London is very heavy, especially the India traffic, and it is mainly for this trade that the British acquired the control of the Suez Canal.

American
commerce

Liverpool is one of the most important ports of Europe and receives most of the American traffic. It is the chief cotton market in Europe.

Other
ports

Southampton is also a port which receives a large share of American traffic. Several American and various other steamship lines discharge at that place. *Hull* and *Shields* have a considerable part of the European traffic. *Glasgow* is one of the foremost centres of steel ship-building. *Cardiff* and *Swansea* are ports connected with the coal and iron trade. *Queenstown* is a calling point for many transatlantic liners.

Manu-
facturing
centres

Manchester is both a cotton port and a great market for the cotton textiles made in the nearby towns of the Lancashire coal-field. *Leeds* and *Bradford* and the towns about them are the chief centres of woollen manufacture. *Wilton* and *Kidderminster* are famous for carpets. *Birmingham* is the centre of the steel manufactures. *Sheffield* has a world-wide reputation for cutlery. In and near the Staffordshire district are the potteries that have made the names of *Worcester*, *Coalport*, *Doulton*, *Copeland*, and *Jackfield* famous. *Belfast* is noted for its linen textiles,

and also for some of the largest steamships afloat that have been built in its yards. *Dundee* is the chief centre of jute manufacture.

The German Empire.—The German empire consists of the kingdoms of Prussia, Bavaria, Saxony, and Württemberg, together with a number of small states. The “free” cities of Hamburg, Bremen, and Lübeck, whose independence was purchased in feudal times, are also incorporated within the empire. The present empire was formed in 1871, at the close of the war between Germany and France. The merging of the states into the empire was designed as a political step, but it proved a great industrial revolution as well.

Constitution

Formation of empire

The plain of Europe which slopes to the North and Baltic Seas, the flood-plains of the rivers excepted, is fairly productive of grain. It is a fine grazing region, however, and the dairy products are of the best quality. Among European states Russia alone surpasses Germany in the number of cattle grown. The province of Schleswig-Holstein is famous the world over for its fine cattle. Cavalry horses are a special feature of the lowland plain, and the government is the chief buyer. The wool product has hitherto been important, but the sheep ranges are being turned into crop lands, on account of the increase of population in the industrial regions.

Surface features

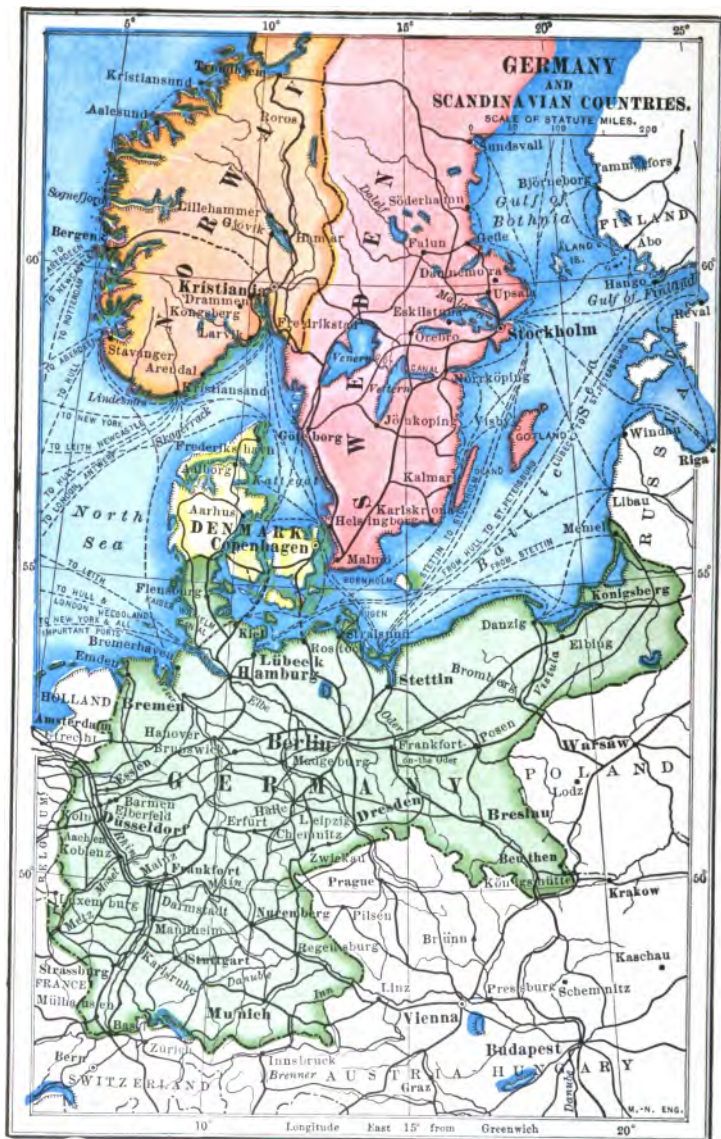
Grazing products

The midland belt, between the coast-plain and the mountains, is the chief food-producing part of Germany. Rye and wheat are grown wherever possible, but the entire grain crop is consumed in about eight months. The United States, Argentina, and Russia supply the wheat and flour; Russia supplies the rye.

Grain product

The sugar-beet is a very important crop, and Germany produces yearly for export about two million tons of sugar, or about as much as Austria, Hungary, and France

Sugar industry



combined. This industry is encouraged by a bounty paid on all sugar exported.* A considerable amount of raw-beet sugar is sold to the refineries of the United States ; Great Britain also is a heavy buyer. The home consumption is relatively small, being about forty-two pounds per capita, or one-half that of the United States. Silesia, the Rhine Valley, and the lowlands of the Hartz Mountains are the most important centres of the sugar industry.

Sugar
consump-
tion

Centres of
sugar-beet
growing

Germany is rich in minerals. Zinc occurs in abundance, and the mines of Silesia furnish the world's chief supply. Most of the lithographic stone in use is obtained at Solnhofen, in Bavaria. Copper and silver are mined in the Erz and Hartz Mountains. During the sixteenth century the mines of the latter region brought the states then forming Germany into commercial prominence and thereby diverted the trade between the North and Mediterranean Seas to the valleys of the Rhine and Elbe Rivers.

Mineral
resources

Effects of
metal
industry

These two metal products made Germany a great financial power. The Franco-Prussian War added to Germany the food-producing lands of the Rhine and Moselle, and the provinces of Alsace and Lorraine. At the same time it gave the Germans organization by welding the various German states into an empire. As a result there has been an industrial development that has placed Germany in the class with the United States and Great Britain.

Political
effects of
metal
industries

By unifying the interstate systems of commerce and transportation, the iron and steel industry has been greatly expanded. The chief centre of this industry is the valley of the Ruhr River. Coal-measures underlie an area somewhat larger than the basin of the river. To the industrial centres of this valley iron ore is brought by the Rhine and Moselle barges from Alsace-Lorraine and Luxemburg.

Industrial
effects of
political
reorganiza-
tion

* This is equivalent to the imposition of a tax on all the sugar consumed at home.

Bavaria and Saxony contain the chief centres of iron manufacture.

In the importance and extent of manufactures, Germany ranks next to Great Britain among European states, and because of the extent of their coal-fields the Germans seem destined in time to surpass their rivals. The manufacture of textiles is one of the leading industries, and, next to Great Britain, Germany is the heaviest purchaser of raw

Reasons
for manu-
factures



LÜBECK

cotton from the United States. The Rhine district is the chief centre of cotton textile manufacture. Raw cotton is delivered to the mills by the Rhine boats, and these carry the manufactured product to the seaboard. Central and South America are the chief purchasers.

Movement
of manu-
factured
products

Woollen goods are also extensively manufactured, the industry being in the region that produces Saxony wool. In Silesia and the lower Rhine provinces there are also

Wool
industry

extensive woollen textile manufactures, but the goods are made mainly from imported wool. Argentina and the other Plate River countries are the chief buyers of these goods. There is a considerable linen manufacture from German-grown flax, and silk-making, mainly from raw silk imported from Italy.

Market
for wool
products

Silk
manu-
facture

The great expansion and financial success of the manufacturing enterprises is due very largely to the admirable



BREMEN

organization of the lines of transportation. The rivers, with their connecting canals, supplement the railways instead of competing with them. They are utilized mainly for slow freights, while the railways carry the traffic that demands speed. The possibilities of both inland water-ways and railway transportation have been utilized by the Germans to the utmost, with the result of a very low rate both for coal and ore, and for structural iron and steel. The

Systems
of canal
and
railway
transportation

Cost of
freights

latter is carried from the various steel-making plants in the Ruhr Valley to the seaboard at a rate of eighty to ninety cents per ton.*

Railway
ownership

The railways in the main are owned and operated by the various German States ; to a certain extent, however, they are under Imperial control and in time of war may be used wholly for military purposes. The navigable rivers are connected by canals. Ludwigs Canal connects the Danube and the Main, furnishing a navigable channel from the mouth of the Danube to the mouth of the Rhine. The Kaiser Wilhelm Canal connects the North and Baltic Seas.

Canal
con-
nections

Effects of
commerce
on indus-
trial de-
velopment

All this has resulted in a wonderful commercial expansion of the empire. In 1875 Germany was neither a maritime nor a naval power. In 1910 it ranked next to the United States as a naval power, and far surpassed that country in the tonnage of merchant marine. The German steamship fleet includes some of the largest and fastest vessels afloat.

Movement
of
commerce

German trade may be summed up as an export of manufactured goods and an import of food-stuffs and raw materials. In 1910 the movement of industrial products amounted to about three and one-half billion dollars. About one-half the trade of the empire is carried on with Great Britain, the United States, Austria-Hungary, and Russia. A large part of the foreign trade is carried on through the ports of Belgium and Holland.

Com-
mercial
relations

Education
as a factor

The tremendous commercial power of the Germans is largely due to education. The educational system begins at the nursery and extends through the universities. The latter are not only famous in themselves, but they have produced a large proportion of the famous scholars and statesmen of the world. School attendance is compulsory

Com-
pulsory
education

* This is a little greater than the average ton-mile rate on the New York Central Railroad between New York and Chicago.

and illiteracy practically does not exist, the rate being about one in twenty-five hundred of population.

Berlin, the capital, is one of the few cities having a population of more than one million. It is not only a great centre of trade, but it is one of the leading money-markets of Europe; it is also the chief railway centre. *Hamburg* and *Bremen* are important ports of German-American trade, the former being the largest seaport of continental Europe. *Breslau* is an important market, into which the raw materials of eastern Europe are received, and from which they are sent to the manufacturing districts. The art galleries of *Dresden* have had the effect of making that city the centre of art manufactures which are famous the world over. *Lübeck* is one of the free cities that was formerly in the Hanse League. *Munich* is the focal point of trade with Italy through Brenner Pass. *Köln* (*Cologne*) is one of the old trading centres of the Rhine district.

Principal
markets

The twin cities, *Barmen-Elberfeld*, in the Ruhr coal-field, form one of the principal centres of cotton manufacture in the world. *Dortmund* is a coal-market. At *Essen* are the steel-works founded by Herr Krupp. They are the largest and one of the most complete plants in the world. The output includes arms, heavy and light ordnance, and about every kind of structural iron and steel used. About forty thousand men are employed. *Leipsic* was the centre of great fairs in the thirteenth century. It is to-day one of the principal markets for furs and pelts. It is also a centre for European book trade. *Dresden* is famous for its variety of manufactures, but "Dresden china" is made at the Kaolin beds of *Meissen*. *Chemnitz* is an important point, not only of cotton manufacture, but also of Saxony wools, underwear and shawls being its most noteworthy products. At *Stettin*, *Danzig*, and *Kiel* are built the steamships that have given to Germany its great commercial power.

Manu-
facturing
centres

QUESTIONS FOR DISCUSSION

In what ways are Great Britain and Germany commercial rivals ?

What are the advantages of each with respect to position ?—with respect to natural resources ?

From the Statesman's Year-Book make a list of the leading exports of each;—the leading imports of each. What exports have they in common ?

FOR COLLATERAL READING AND REFERENCE

Adams's New Empire—Chapter III.

Gibbins's History of Commerce—Book III, Chapters III-V.

CHAPTER XXVI

EUROPE—THE BALTIC AND NORTH SEA STATES

THESE states, like Great Britain and Germany, belong to Germanic Europe, and their situation around the North and Baltic Seas makes their commercial interests much the same. From the stand-point of commerce Holland might be regarded as an integral part of Germany, inasmuch as a large part of the foreign commerce of Germany must reach the sea by crossing that state.

Germanic
origin

Com-
mercial
solidarity

Sweden and Norway.—Sweden and Norway occupy the region best known as the Scandinavian peninsula. The western side faces the warm, moist winds of the Atlantic, but the surface is too rugged to be productive. The lands suitable for farming, on the other hand, are on the east side, where, owing to the high latitude, the winters are extremely cold.

Situation

Climate
and
topog-
raphy

The plateau lands are in the latitude of the great pine-forest belt that extends across the two continents. The forests of the Scandinavian peninsula are near the most densely peopled part of Europe, and they are also readily accessible. The rugged surface offers unlimited hydro-electric power. As a result Norway and Sweden practically control the lumber-market of Europe, and their lumber products form one of the most important exports of the kingdom. Norway pine competes with California red-wood in Australia. "The naval stores," tar and pitch, compete with those of Georgia and the Carolinas. The wood-pulp from this region is the chief supply of the

Natural
resources

Com-
mercial
compe-
tition with
United
States

Forest products paper-makers of Europe. Next to Russia, Sweden has the largest lumber-trade in Europe. The Mediterranean states are the chief buyers.

Coal The mineral products are varied. Coal occurs at Helsingborg. Building stone is shipped to the nearby low-land countries. Swedish manganese-iron ores, essential in steel manufacture, are shipped to the United States, competing with the ores of Spain and Cuba. The mines of the Gellivare district are probably the only iron-mines of consequence within the frigid zone. The ore is sent to German and British smelteries.

Fisheries The fisheries are the most important of Europe, and this fact has had a great influence on the history of the people. Centuries ago the people living about the *vigs* or fjords of the west coast were compelled to depend almost wholly on the fisheries for their food-supplies. As a result they became the most famous sailors of the world. They established settlements in Iceland and Greenland; they also planted a colony in North America 500 years before the voyage of Columbus. Herring, salmon, and cod are the principal catch of the fisheries, and about four-fifths of the product is cured and exported to the Catholic European states and to South America.

Grain growing South of Kristiania farming is the principal industry. Much of the land is suitable for wheat-growing, but the productive area is so small that a considerable amount of bread-stuffs must be imported from the United States. On account of the high latitude the winters are too long and severe for any but the hardiest grains. Dairy products are commercially the most important output of the farms, and they find a ready market in the populous centres of Europe—London, Hamburg, Paris, and Berlin.

Commerce of dairy products The lumber, furniture, matches, fish, ores, and dairy products sold abroad do not pay for the bread-stuffs, coal,

Adjusting balance of trade

petroleum, clothing, and machinery. In part, this is made up by the carrying trade of Norwegian vessels; the rest of the deficit is more than met by the money which the throngs of tourists spend during the summer months.

The United States buys from these countries fish and ores to the amount of about four million dollars a year; it sells them cotton, petroleum, bread-stuffs, and machinery to the amount of about twenty million dollars.

Commerce
with
United
States

Stockholm, the capital of Sweden, is the chief financial and distributing centre of the Scandinavian trade. Its railway system reaches about every area of production. Although having a good harbor of its own, it must depend on *Trondhjem* (Drontheim) for winter traffic, because the Baltic ports are closed by ice much of the winter. *Kristiania*, the capital of Norway, is the export market of the fish and lumber products.

Principal
trade
centres

Göteborg, with railway and canal connections, has become an important port. It is convenient to other European ports, and is rarely closed by ice. *Bergen*, *Trondhjem*, and *Hammerfest* derive a heavy income from their fisheries and likewise from the tourists who visit the coast in midsummer. Although farther north than any other town in the world, *Hammerfest* has an open harbor during the winter.

Other
com-
mercial
centres

Denmark.—Denmark is essentially an agricultural state, and nearly all the available land is cultivated. Even the sand-dunes, which resulted from the destruction of the coast timber, have been reclaimed and converted into pasture. The yield of wheat is greater per acre than in any other country, but only a small area is sown.

Extent of
culti-
vation

Wheat
yield

About half the area of the state is used in growing fodder for horses and cattle. The dairy products, especially butter, are unrivalled elsewhere in Europe. The dairy business is largely controlled by a cooperative association

Dairy and
crop
products

of dairymen and farmers. Pastures, fodder, cattle, sheds, creameries, and all the processes involved are subject to a rigid sanitary inspection. The sugar-beet is the chief crop.

Com-
mercial
import-
ance
of a free
port

Copenhagen, the capital, is the financial centre of the kingdom. Commercially it is one of the most important ports of Europe. Cargoes consigned to Baltic ports break bulk at this city and are again transshipped to their destination. To facilitate this forwarding business, the Crown has made *Copenhagen* a free port. Steamship lines connect it with New York, British ports, and the East Indies; car ferries with the continent.

Manu-
factures
and
exports

A great deal of farming and dairy machinery is manufactured; coal, cotton goods, and structural machinery are imported from the United States. Little, however, is exported to the United States, the dairy products being sold to London and other populous centres of western Europe. *Aalborg* and *Aarhuus* are dairy-markets.

Colonial
trade and
products

Greenland and Iceland are colonies of Denmark, and the fishing industry of the kingdom is carried on mainly along the shores of these islands. The furs, seal-skins, seal-oil, and eider-down of Greenland are a government monopoly. The mineral cryolite occurs at Ivigtut and is mined by soda-making establishments in the United States. Iceland produces sheep, cattle, and fish; these are shipped from *Reikiavik*. The Faroe Islands produce but little save wool, feathers, and birds' eggs.

Results of
human
enterprise

Creation
of a
textile
industry

Belgium.—Probably in no other country of Europe has nature done so little and man so much to make a great state as in Belgium. The lowland region has been made so fertile by artificial means that it yields more wheat per acre than any other country except Denmark. The Ardennes highland in the southeast is naturally unproductive, but it has become one of the great manufacturing

centres of Europe. Less than one-twelfth of the area of the state is unproductive.

The coast, more than twoscore miles in extent, has not a single harbor for large vessels, and the two navigable rivers, the Scheldt and Meuse, flow into another state before reaching the sea.

Lack of
harbors

The low sand-barrens next the coast have been reclaimed

Reclama-
tion of
sand-
barrens



Political
results

country, and all western Europe depended upon the Flemish looms for cloth. This industry, therefore, gave the country not only commercial prominence, but was largely responsible for its political independence as well. Flax is still an important product, and the linen textiles, including fine laces, made in the state are without a superior. Much of the flax is grown in the valley of the River Lys.

Other
textile
manu-
factures

Mineral
resources

One of the most productive coal-fields of Europe stretches across Belgium, and a few miles south of it are the iron-ore deposits that extend also into Luxemburg and Germany. In addition to these, the zinc-mines about Moresnet are among the richest in the world. Belgium is, therefore, one of the great metal-working centres of Europe. A small part of the coal is exported to France, but most of it is required in the manufactures.

Results of
mineral
wealth

Liège, *Seraing*, and *Verviers* are the great centres of the metal industry. They were built at the eastern extremity of the coal-field, within easy reach of the iron ores. Firearms, railroad steel, and tool-making machinery are the chief products of the region, and because of the favorable situation, they easily compete with the manufactures of Germany and France.

Centres of
metal
industry

Ghent is the chief focal point for the flax product, which is converted into the finest of linen cloth and art fabrics. Much of the weaving and spinning machinery employed in Europe is made in this city. *Mechlin* and the villages near by are famous the world over for hand-worked laces. They are known as "point" lace.

Centres of
textile
industry

Expensive porcelains, art tiles, glassware, and cheap crockery are made in the line of kilns that stretches from one end of the coal-field to the other.

Location
of
porcelain
industry

The railways are owned and operated by the state. They are managed so judiciously, moreover, that the rates of carriage are lower than in most European states. The

Scheldt is navigable for large ocean steamers to *Antwerp*, and this city is the great Belgian port for ocean traffic. The city owes its importance to its position. One branch of the Scheldt leads toward the Rhine; the other is connected by a canal with the rivers of France; the main stem of the river points toward London. It is therefore the meeting of three ways. It is the terminal of the steamships of American, and of various other lines. It is also the depot of the Kongo trade. Ship-canals deep enough for coasters and freighters connect *Ghent*, *Bruges*, and *Brussels* with tide-water. These are about to be converted to deep-water ship-canals.

Commer-
cial centres
and trade-
routes

The foreign commerce of Belgium is much like that of other European states. Wheat, meat, maize, cotton, and petroleum are imported mainly from the United States; iron ore is purchased from Luxemburg and Germany, and various raw materials are brought from France. In exchange fine machinery, linen fabrics, porcelains, fire-arms, glassware, and beet-sugar are exported. From the Kongo state, now a possession of Belgium, are obtained rubber, ivory, and copal. These are marketed at Antwerp; most of the rubber is sold in American markets.

Character
of foreign
commerce

Brussels is the capital and financial centre. On account of the state control of the railways, it is also the directive centre of all the industries pertaining to commerce and transportation.

Directive
centre¹

Holland.—The names Holland and Netherlands mean "lowland," and the state itself has a lower surface than any other country of Europe. Nearly half the area is at high-tide level or else below it. A large part, mainly the region about the *Zuider** Sea, has been reclaimed from the sea.

Surface
features

In the reclamation of these lands stone dikes are built

*The name *Zuider*, or *Zuyder*, means "south"; it was so named to distinguish it from the North Sea.

Method of
reclama-
tion

to enclose a given area, and from the basin thus constructed the water is pumped. The reclaimed lands, or "polders," include not only the sea-bottom, but the coast marshes as well; even the rivers are bordered with levees in order to prevent overflows. Windmills are the machinery by which the water is pumped from the polders into the sea. In no other part of the world is wind-power so extensively used. Almost every acre of the polders is under cultivation, and these lands grow a very large part of the vegetables and flowers consumed in the great cities of England, France, and Belgium.

Extent of
cultivation

Grazing
products

The coast sand-barrens have been converted into pasture-lands that produce draught-horses, beef cattle, and dairy cattle. The horses find a ready market in the United States and the large European cities; the dairy cattle not needed at home are exported, the United States being a heavy purchaser. The beef cattle are grown mainly for the markets of London. Dutch butter is used far beyond the boundaries of the state, and Edam cheese reaches nearly every large city of Europe and America.

Dairy
products

Sugar
industry

The sugar-beet is extensively cultivated, in spite of the great trade resulting from the cane-sugar industry of the East Indies. It is more profitable to import wheat from the United States and rye from Russia in order to use the land for the sugar-beet.

Commerce
of building
material

Practically no timber suitable for lumber manufacture exists, and building material therefore must be imported. Pine is purchased from Russia, Scandinavia, and the United States. Stone is purchased wherever it may be obtained as return freight, or as ballast. The coast fisheries yield oysters, herrings, and "anchovies," which are not anchovies, but sprats.

Fisheries

For want of coal and iron there are few manufactures, and the garden and dairy products are about the only ex-

port articles. There is an abundance of clay, and of this brick for road-making, tiles for building purposes, and porcelains are made. But little of the raw sugar is refined; most of it is sold to foreign refiners, and the United States is one of the chief customers.

Manu-
factures

Commerce
of sugar

Holland is a great commercial country, and for more than five hundred years the Dutch flag has been found in almost every large port of the world. Much of the commerce is derived from the tobacco, sugar, and coffee plantations of the Dutch East Indies.

Other
foreign
commerce

A very large part of the commerce, however, is neither import or export trade, but a "transit" commerce. Thus, American coal-oil is transferred from the great ocean tank-steamers to smaller tank-boats, and is then carried across the state into Germany, France, and Belgium, through the numerous canals.

Import
transit
trade

This trade applies also to many of the products of the German industries which will not bear a heavy freight tariff, such as coal, ores, etc. It reaches the Rhine and Rhone river-basins and extends even to the Danube. Both Switzerland and Austria-Hungary send much of their exports through Holland. All trade at the various ports and through the canals is free, it being the policy to encourage and not to obstruct commerce.

Export
transit
trade

Policy of
free ports

Amsterdam, the constitutional capital, is one of the great financial and banking centres of Europe. The completion of the Nord Holland canal makes the docks and basins accessible to the largest steamships. Diamond-cutting is one of the unique industries of the city. Since the discovery of the African mines its former trade in diamonds has been largely absorbed by London.

Financial
centre

Diamond
industry

More than half the carrying trade of the state centres at *Rotterdam*. By the improvement of the river estuaries and canals this city has become one of the best ports of

Other
ports

Europe, and the tonnage of goods handled at the docks is enormously increasing. *Vlissingen* (Flushing) and the *Hook* are railway terminals that handle much of the local freights consigned to London. *Delft* is famous the world over for the beautiful porcelain made at its potteries.

QUESTIONS FOR DISCUSSION

How has the topography of each of these states affected its commerce?

How is their commerce affected by latitude and climate?

How has the cultivation of the sugar-beet affected the cane-sugar industry in the British West Indies?

From the Statesman's Year-Book make a list of the leading exports and imports of each country.

From the Abstract of Statistics find the trade of the United States with each of these countries.

FOR COLLATERAL READING AND REFERENCE

Adams's New Empire—pp. 153-159.

Gibbins's History of Commerce—Book III, Chapters I and VIII.

CHAPTER XXVII

EUROPE—THE MEDITERRANEAN STATES AND SWITZERLAND

THE Mediterranean states are peopled mainly by races whose social and economic development was moulded largely by the Roman occupation of the Mediterranean basin for a period of more than one thousand years. The occupations of the people have been shaped to a great extent by the slope of the land and by the mountain-ranges that long isolated them from the Germanic peoples north of the Alps.

Effects of
Roman
occupation

France.—The position of France with respect to industrial development is fortunate. The North Sea coast faces the ports of Great Britain; the Atlantic ports are easily accessible to American centres of commerce; the Mediterranean ports command a very large part of the trade of that sea.

Fortunate
position

The easily travelled overland routes between the Mediterranean and North Seas in very early times gave the country a commercial prominence that ever since has been retained. Even before the time of Cæsar it was a famous trading-ground for Mediterranean merchants, and the conquest of the country was not so much for the spoils of war as for the extension of Roman commercial influence.

Effects of
early
trade-
routes

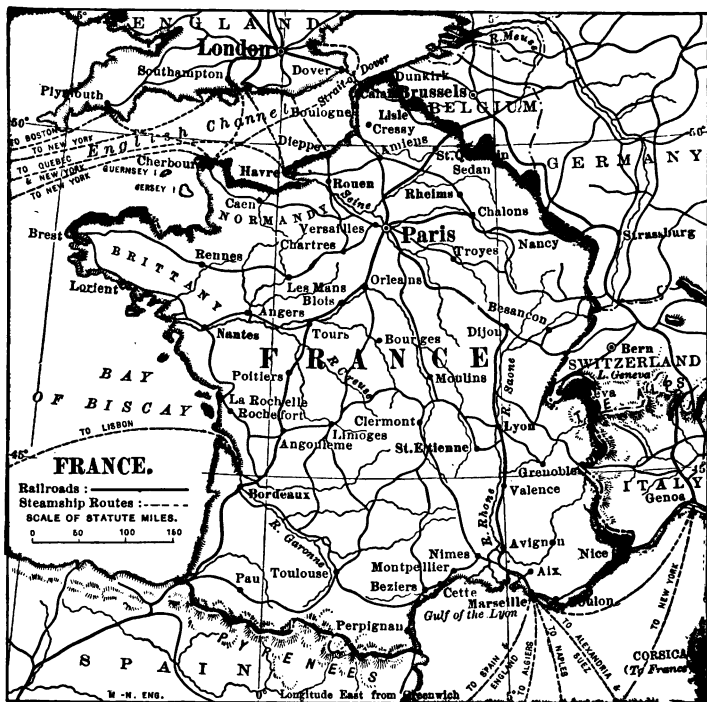
The greater part of France is an agricultural region, and nowhere is the soil cultivated with greater skill. Although the state is not quite as large as Texas, there are more farms than in all the United States, their small size making thorough cultivation a necessity. Much of the land is

Skilful
agriculture

Distribu-
tion of
crops

too valuable for wheat-farming, and so the eastern manufacturing districts depend upon the Russian wheat-farms for their supply. Northwestern France, however, has a surplus of wheat, and this is sold to Great Britain.

The sugar-beet is the most profitable crop, and its culti-



Sugar
industry

vation is aided indirectly by the government, which gives a bounty on all exported sugar. The area of sugar-beet cultivation will probably increase to its limit for this reason.

Fruit
cultivation

The French farmer is an artist in the cultivation of small fruits, and the latter form an important source of

revenue. Of the fruit-crop, the grape is by far the most important commercially. French wines, especially the champagnes, are exported to a greater extent than the wines of any other country. Most of the wine is sold in Great Britain and the countries north of the grape belt; a considerable part is sold in the United States and the eastern countries. Champagne, Bordeaux, the Loire, and the Rhone Valleys are famous wine districts. Wine is also imported, to be refined or to be made into brandy. In recent years the reputation of French wine, especially those sold as "champagne," has been injured by the sale of great quantities of spurious products manufactured from cheap white wines, artificially flavored and aerated. These are made for export trade.

Wine
industrySpurious
wines

Cattle-breeding, both for meat and for dairy purposes, is extensively carried on. The meat is consumed at home. Butter is an important export, especially in the northwest, where a large amount is made for London consumers. This region produces Camembert and Neufchatel cheese, both of which are largely exported; Brie cheese is made chiefly along the German border. The Roquefort product, made of ewe's milk, is fermented in limestone caves and cellars. All these varieties have a large sale, the United States and Great Britain being heavy purchasers.

Cattle
productsDairy
industry

Percheron and Norman draught-horses are raised for export as well as for home use; mules are extensively raised for the army wagon-trains of Great Britain and Germany. Sheep are grown for the finer grades of wool, but so much of the sheep pasture has been given to the cultivation of the sugar-beet, that a considerable part of the woollen textiles are now made of wool imported from Argentina. A large part of the eggs and table poultry consumed in London are products of northwestern France.

Draught
horses

Wool

Sugar
industry

Poultry

The coal-fields of the north produce nearly two-thirds

Iron and
coal

of the total amount consumed. Iron ores found near the German border are sent to coal-fields near St. Étienne and Le Creuzôt to be made into steel. Both coal and iron ore are deficient. To meet the requirements, coal is imported from Great Britain, Germany, and Belgium; iron ore mainly from Germany and Spain. Abundant hydro-electric power partly offsets the lack of coal.

Coal and
iron
imports

Hydro-
electric
power

Influence
of French
manu-
factures

The manufactures of France have a wide influence. From the coal and iron are derived the intricate machinery that has made the country famous, the railways, the powerful navy, and the merchant marine that has made the country a great commercial nation. Because of the great creative skill and taste of the people, French textiles are standards of good taste, and they find a ready market in all parts of the world. In textile manufactures more than one million people and upward of one hundred thousand looms are employed.

Textile
manu-
factures

Commerce
of French
textiles

The United States is a heavy buyer of the woollen cloths and the finer qualities of dress goods. Inasmuch as these goods have not been successfully imitated elsewhere, the French trade does not suffer from competition. The best goods are made from the fleeces of French merino sheep, and are manufactured mainly in the northern towns. The Gobelin tapestries of Paris are famous the world over.

Cotton
manu-
factures

The cotton manufactures depend mainly on American cotton. About two-thirds of the cotton is purchased in the United States, a part of which returns in the form of fine goods that may be classed as muslins, tulles, and art textiles. The market for such goods is also general. In the manufacture of fine laces, such as the Point d'Alençon fabrics, the French have few equals and no superiors. The flax is imported mainly from Belgium.

Lace
manu-
facture

Silk culture is aided by the government, and is carried

on mainly in the south. The amount grown, however, is insufficient to keep the factories busy, and more than four-fifths of the raw silk and cocoons are imported from Italy and other southern countries.

Silk
cultivation

The chief imports to France are coal, raw textile fibres, wine, wheat, and lumber. The last two products excepted, they are again exported in the form of manufactured products. The great bulk of the imports comes from Great Britain, the United States, Germany, Belgium, Russia, and Argentina. The exports consist chiefly of art manufactures, automobiles, preserved fruit, olive oil, and wines.

Character
of imports

Exports

The foreign trade is supported by a navy, which ranks second among the world's navies, and a merchant marine of more than fifteen thousand vessels. Aside from the subsidies given to mail steamships, government encouragement is given for the construction and equipment of home-built vessels. It is a settled policy that French vessels shall carry French traffic.

Navy and
subsidized
vessels

Of the 24,000 miles of railway, about 2,000 miles are owned by the state. The rivers are connected by canals, and these furnish about 7,000 miles of navigable waters. As in Germany, the water-routes supplement the railway lines. By means of canals and canalized rivers almost any river front may be reached from Havre, Marseille, or Bordeaux. Practically all lines of transportation converge at Paris.

Railways

Canals

Paris, the capital, is a 'great centre of finance, art, science, and literature, whose influence in these features has been felt all over the world. The character of fine textiles, and also the fashions in the United States and Europe, are regulated largely in this city. *Marseille* is the chief seaport, and practically all the trade between France and the Mediterranean countries is landed at this port; it is also the focal point of the trade between France and her

Commer-
cial and
financial
centre

Mediterranean
port
of trade

African colonies, and a landing-place for the cotton brought from Egypt and Brazil.

Manu-
facturing
centres

Havre, the port receiving most of the trade from the United States, is the port of Paris. *Rouen* is the chief seat of cotton manufacture. *Paris* and *Rheims* are noted for shawls. *Lille* and *Roubaix* are centres of woollen manufacture. *Lyons* is the great seat of silk manufacture. At *Limoges*, long famous for its potteries, fine kaolin and coal are near each other. *Bordeaux* is the centre of a great wine district and divides with *Nantes* the sardine packing industry.

Produc-
tivity

Italy.—Italy is a spur of the Alps extending into the Mediterranean Sea. It has always been an agricultural state and, excepting the periods when rent by wars, has been one of the most productive countries in the world.

Grain
crops

Wheat is extensively grown, but the crop is insufficient for home use; the deficit is imported from Russia and Hungary. Most of the crop is grown in the valley of the Po River. Flax and hemp are grown for export in this region; and corn for home consumption is a general product. Cotton is grown in Sicily and the south, but the amount is insufficient for use and is made up by imports from the United States and Egypt.

Textile
crops

Commer-
cial
products

Silk, fruit, and vegetables are the staple commercial products of Italy. Italy is one of the foremost countries in the production of raw silk. Most of the crop is produced in northern Italy; western Europe and the United States are the chief buyers.

Fruit
exports

Fruit is the crop next in value to raw silk. Sicilian oranges and lemons, from about twenty millions of trees, find a ready market in Europe; they also come into competition with the California and Florida fruit of the

United States, in spite of the tariff imposed against them by the latter country. Olives are probably the most important fruit-crop. Both the preserved fruit and the oil are exported to nearly every civilized people. Much of the

Commerce
of olive
crop



oil is consumed at home, very largely taking the place of meat and butter. Lucca oil is regarded as the best.

The grape-crop is enormous, and the fruit itself is exported. Some of the fruit sold as "Malaga" grapes throughout the United States during winter months comes from Italy. Chianti wine, from the vineyards around

Grape and
wine crop

Florence, has hitherto been regarded as an inferior product, but the foreign demand for it is steadily increasing. The Marsala wines of Sicily are largely exported.

Iron

Among mineral products the iron deposits in the island of Elba are undoubtedly the most valuable, but they are yet undeveloped to any great extent. The quarries at Carrara produce a fine marble that has made Italy famous in sculpture and architecture. Much of the boracic acid used in the arts comes from Tuscany, and the world's chief supply of sulphur comes from the neighborhood of Mount Etna in Sicily. Of this Americans buy about one-third.

Marble

Boracic
acid

Sulphur

Art
manu-
factures

On account of the lack of coal, the manufactures are restricted mainly to art wares, such as jewelry, silk textiles, and fine glassware. The Venetian glassware, the Florentine and mosaic jewelry, and the pink coral ornaments are famous the world over. Within recent years, however, imported coal, together with native lignite, have given steel manufacture an impetus. Steel ships and rails made at home are meeting the demands of commerce. Goods of American cotton are made for export to Turkey and South American countries.

Steel
manu-
facture

Export
manu-
factures

Other
exports

Imports
and
foreign
trade

Raw silk, wine, olive-oil, straw goods, sulphur, and art goods are exported. Cotton, wheat, tobacco, and farm machinery from the United States, and coal, woollen textiles, and steel goods from Great Britain are the chief imports. Most of the foreign trade is with the nearby states. The raw silk goes to France.

Railways

Since the unification of Italy the railways have been readjusted to the needs of commerce. Before that time the lines were wholly local in character; with the readjustment they were organized into trunk lines. They enter France through the Mont Cenis tunnel; they reach Switzerland and Germany by way of St. Gotthard and Simplon tunnels; they cross the Austrian border through Brenner Pass.

Rome, the capital, is a political rather than an industrial centre. *Milan*, the Chicago of the kingdom, is the chief market for the crops of northern Italy and a great railway centre. It is also the market for raw silk. *Genoa*, the principal port, is the one at which most of the trade of the United States is landed. *Naples* monopolizes most of the marine traffic between Italy and Great Britain. *Leghorn* is famous for its manufacture and trade in straw goods. A considerable part of the grain harvested in the Po Valley is stored for shipment at *Venice*—not in elevators, but in pits. *Palermo* is the trading centre of Sicily. Most of the sulphur is shipped from *Catania*. *Brindisi* and *Ancona* are shipping-points for the Suez Canal route.

Centres of
manu-
facture
and
commerce

Spain and Portugal.—The surface of these states is too rugged and the climate too arid for any great agricultural development. Less than half the area is under cultivation; nevertheless, they are famous for several agricultural products—merino wool, wine, and fruit. The merino wool of the Iberian peninsula has no equal for fine dress goods; it is imported into almost every other country having woollen manufactures. A considerable amount of ordinary wool is grown, but not enough for home needs.

Agricult-
ural and
grazing
products

The fruit industry is an important source of income. Oranges, limes, and lemons are extensively grown for exports; among these products is the bitter orange, from which the famous liqueur curaçao, a Dutch manufacture, is made. The heavy, sweet port wine, now famous the world over, was first made prominent in the vineyards of Spain and Portugal. Malaga raisins are sold in nearly every part of England and America. The olive is more extensively cultivated than in any other state, but both the fruit and the oil are mainly consumed at home—the latter taking the place of butter. Raw silk is grown for export to France.

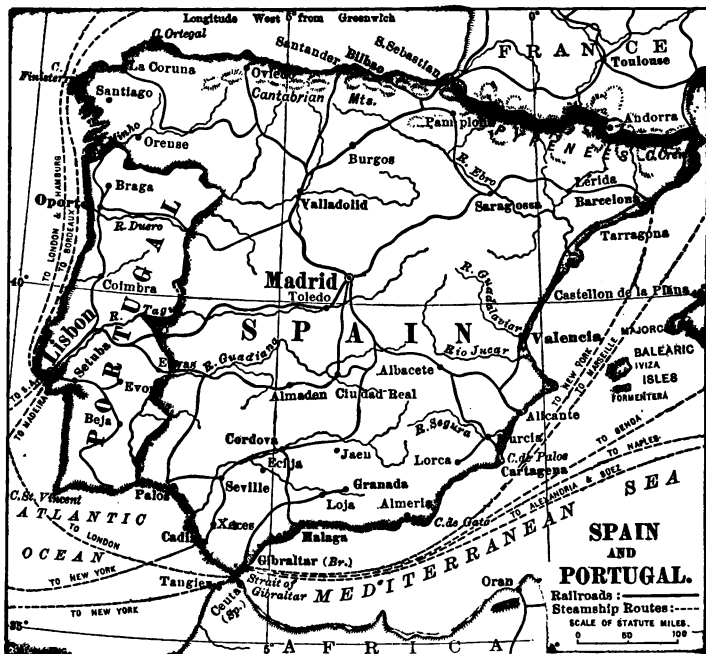
Fruit and
silk
industries

Although a larger part of the peninsula must depend on

Cork

the American and Scandinavian forests for lumber, there is one tree product that is in demand wherever bottles are used—namely, cork. The cork is prepared from the bark of a tree (*Quercus suber*) commonly known as the cork oak,* which grows freely in the Iberian peninsula and northern Africa.

Metals and minerals of economic use are abundant.



Iron and coal

Iron ore is sold to Great Britain, France, and Germany. Since the Spanish-American War, however, there have been extensive developments in utilizing the coal and the ore which before that time had been sold to other countries.

* It is cultivated as an ornamental tree in the Southern States and in California.

The undeveloped coal, copper, and iron resources are very great, and must figure in the payment of a national debt that is near the limit of bankruptcy. The state, however, has entered a period of industrial prosperity.

Undeveloped resources

The most available metal resource is quicksilver. Of this metal the mines in Almaden produce about one-half the world's supply. The working of these mines is practically a government monopoly, and the income was mortgaged for many years ahead when Spain was at war with her rebellious colonies.

Quicksilver

Both Spain and Portugal are poorly equipped with means for transportation. The railways lack organization, and freight rates are excessive. Not a little of the transportation still depends on the ox-cart and the pack-train. The merchant marine has scarcely more than a name; the foreign commerce is carried almost wholly in British or French bottoms. The imports are mainly cotton, coal, lumber, and food-stuffs—these in spite of the fact that every one save lumber might be produced at home.

Railways and merchant marine

Imports

Wine and fruit products, iron ore, and quicksilver are leading exports. Of these the United States purchases wine and raisins for home consumption and lace and filigree work for the trade with Mexico. Spain has a considerable trade in cotton goods with her colonies, the Canary Islands, and the African provinces of Rio de Oro and Adrar.

Exports

Portugal likewise supplies her foreign possessions—Goa (India), Macao (China), and the Cape Verde and Azores Islands—with home products. The chief Portuguese trade, however, is with Great Britain and Brazil.

Portuguese trade

Madrid is the capital of Spain. *Barcelona* is the chief commercial centre. *Valencia*, *Alicante*, *Cartagena*, and *Malaga* are all ports of fruit and wine trade. *Oporto* has been made famous for the port wine that bears its name. Probably not one per cent. of the port now used, how-

Trade centres

ever, comes from Oporto, and not all Malaga raisins come from Malaga.

Effects of
surface on
industries

Switzerland.—This state is situated in the heart of the highest Alps. The southeastern half is above the altitude in which food-stuffs can be produced, and probably no other inhabited country has a greater proportion of its area above the limits of perpetual snow. A considerable area of the mountain-slopes affords grazing. The valley-lands of the lake-region produce a limited amount of food-stuffs, but not enough for the sparse population.

Political
organiza-
tion

Politically, Switzerland is a republic, having the position of a "buffer" state between Germany, Italy, France, and Austria-Hungary. Racially, the state is divided among Italians, French, and Germans; as a matter of fact, however, the old Helvetian spirit, which not even Cæsar could destroy, is still a great factor in dominating the people; this, with their montane environment, gives the Swiss a very positive nationality.

Importa-
tion of
bread-
stuffs

The agricultural interests of the state are developed to their utmost; two-thirds of the bread-stuffs, however, are purchased from the United States, the plains of Bohemia, and Russia. Cherries, apples, grapes, and other fruit are cultivated in every possible place, and as these can be delivered to any part of western and central Europe within a day, the fruit industry is a profitable one.

Fruit
trade

Cattle and
dairy
products

Cattle are bred for dairy purposes, but those for beef must be very largely imported, Austria-Hungary and Italy selling the needed supply. Goats are raised for their hides, and the latter are converted into Morocco leather. Of the dairy products, cheese is in many respects the most important; Gruyère cheese is exported to nearly every country. On account of the long distance from populous centres milk cannot be transported; much of it is, therefore, condensed, and in that form exported.

A peculiar feature of the dairy industry is the fact that it is constantly moving. The dairy herds begin to pasture in the lowlands as soon as the snow melts, and as fast as the snow line recedes up the mountains the cattle follow. The milk is converted into butter and cheese wherever the herds may be, and the second crop of grass below them is cut and cured for winter forage.

Moving
dairy
industry

In spite of the fact that Switzerland has no available coal,* manufacture is pre-eminently the industry of the state. During the long winters the Alpine herdsman and his family whittle out wooden toys from the stock of rough lumber laid by for the purpose. Farther down in the valley-lands the exquisite brocades and muslins are made on hand-loom, or by the aid of the abundant water-power. Each industrial district has its special line of manufacture, so that there is scarcely an idle day in the year.

Toy and
textile
manu-
factures

In the cities and towns of the lowland district-watches, clocks, music-boxes, and fine machinery are manufactured. For many years Swiss watches were about the only ones used in the United States, but on account of the competition of American watches this trade has fallen off. The mechanical music-player, operated by perforated paper, has also interfered with the trade in music-boxes.

Mechanical
manu-
factures

Switzerland is provided with excellent facilities for transportation, and this has done about as much for the commercial welfare of the state as all other industrial enterprises. In proportion to its area, the railway mileage is greater than that of the surrounding states. The roads are well built and the rates of transportation are low.

Railways

In addition to the ordinary trip-tickets, monthly time-tickets are issued to travellers, allowing the holders to travel when and where they please within the limits of the state on all roads and lake-steamers. These are sold

Tourist
service

* A small vein of coal occurs near Freiburg.

Carriage
roads

to the traveller for less than the price of the 1,000-mile book of the American railway. The carriage roads have no superiors, and they penetrate about every part of the state below the snow line; they also cross the main passes of the Alps.

Railway
passes

Through one or another of these passes most of the foreign traffic of the state must be carried. To Genoa and Milan it crosses the Alps via the St. Gotthard tunnel, or the Simplon Pass;* to Paris it goes by the Rhone Valley; between Vienna and Switzerland, by the Arlberg tunnel; and to Germany or to Amsterdam through the valley of the Main.

Policy of
attraction

As a result of this most excellent system of transportation, Switzerland is thronged with visiting tourists at all times of the year; moreover, it has always been the policy of the Swiss Government not only to provide for them, but also to make the country attractive to them. The result has shown the wisdom of the policy. Indeed, the foreign tourist has become one of the chief sources of income of the Swiss people, and the latter profit by the transaction to the amount of many millions of dollars each year.

Import
trade

About all the raw material used in manufacture must be imported. The cotton is purchased mainly from the United States, and enters by way of Marseille. The raw silk is purchased from Italy, China, and Japan. Coal, sugar, food-stuffs, and steel are purchased from Germany, and this state supplies about half the imports. From the United States are purchased wheat, cotton, and coal-oil.

The manufactures are intended for export. The fine

*The St. Gotthard tunnel is almost nine and one-half miles long; the Arlberg tunnel is six and one-half miles in length. The tunnel under Simplon Pass is more than twelve miles long. Five railways cross the northern frontier into Germany, and German commerce profits most by them.

cotton textiles sold in the United States are worth far more than the raw cotton purchased therefrom. Silk textiles, straw wares, toys, watches, jewelry, and dairy products are leading exports. The surrounding states are the chief buyers, and none of them competes with Switzerland to any extent in the character of the exports.

Manu-
factures

Markets

Geneva, situated at the head of the Rhone Valley, is the chief trade depot; it is noted especially for the manufacture of watches, of which many hundred thousand are made yearly. Timepieces are also made at *Jura*. *Zurich* is the centre of manufactures of textiles and fine machinery. The silk-brocade industry is centred chiefly in this city and *Basel*.

Other
centres of
manu-
facture

QUESTIONS FOR DISCUSSION

Why did not France prosper commercially prior to the time of the revolution of 1793?

What are the chief natural advantages of the state in favor of commercial development?

In what ways have the natural disadvantages of Switzerland been overcome?

How has the loss of her colonies affected the industrial development of Spain?

Comparing Spain and Italy, which has the better situation with reference to the Suez Canal traffic?

From the Statesman's Year-Book find the amount of foreign trade of each state.

From the Abstract of Statistics find the trade of each one with the United States.

FOR COLLATERAL READING AND REFERENCE

Adams's New Empire, pp. 160-168.

Fiske's Discovery of America, Vol. II, Chapter XI.

Procure for inspection specimens of raw silk and also of the choice textile goods made in these states.

CHAPTER XXVIII

EUROPE—THE DANUBE AND BALKAN STATES

Reasons for commercial importance **THE** Danube and Balkan states derive their commercial importance partly from the large area in which bread-stuffs may be produced, and also because the valley of the Danube has become an overland trade-route of growing importance between the Suez Canal and the North Sea.

Political organization **Austria-Hungary.**—This empire is composed of the two monarchies, Austria and Hungary, each practically self-governed, but united under a single general government. The greater part of the country is walled in by the ranges of the Alps and the Carpathian Mountains.

Swiss peoples The region known as the Tyrol is topographically continuous with Switzerland, and the people have Swiss characteristics. Galicia, northeast of the Carpathian Mountains, the fragment of Poland that fell to Austria at the time of partition, is a part of the great Russian plain.

Slavic peoples Bohemia, which derives its name from the Keltic peoples, whom Cæsar called the Boii, comprises the upper part of the Elbe river-basin. Its natural commercial outlet is Germany, but the race-hatred which the Czechs have for the Germans, retards commercial progress. Hungary is a country of plains occupying the lower basin of the Danube.

Keltic peoples The Huns are of Asian origin. Austria proper occupies the upper valley of the Danube, adjoining Germany; the country and the people are Germanic.

Huns To the student of history it is a surprise that a country of such diverse peoples, having but little in common save

Germanic peoples

mutual race-hatred, should hold together under the same general government. An explanation, however, is found in the topography of the region. The basin of the Danube is a great food-producing region, and the upper valley of the Elbe River forms the easiest passage from the Black to the Baltic Sea. The topography therefore gives the country commercial unity.

Reasons
for com-
mercial
unity

The climate and surface of the low plains of Hungary are much the same as those of Wisconsin and Minnesota. Grain-growing and stock-raising are the chief employments. High freight rates, a long haul, and the competition of Russia and Roumania have retarded the development of these industries, however. Bohemia is likewise a grain-growing country, and the easy route into Germany through the Elbe Valley makes the industry a profitable one. Bohemia is also in the sugar-beet area.

Industries
of
Hungary

Industries
of
Bohemia

There is an abundance of coal in Austria, but most of it is unfit for the manufacture of iron and steel. Steel manufacture, however, is carried on, the industry being protected by its distance from the German steel-making centres. The lead-mines about Bleiberg (or "Leadville") are very productive; at Idria are the only quicksilver-mines in Europe that compete with those of Almaden, Spain. The salt-mines near Krakow are in a mass of rock-salt twelve hundred feet thick.

Steel
manu-
facture

Lead
mining

Salt
mining

Most of the manufactured products are for home consumption. American cotton and home-grown wool supply the greater part of the textiles. The flour-mills are equipped with the very best of machinery, and much of the product is for export to Germany and the countries to the south. The manufactures that have made the state famous, however, are gloves and glassware, both of which are widely exported. The sand, fluxes, and coloring minerals of Bohemian glassware are all peculiar to the region, and the

Textile
manu-
factures

Flour-
making

Glass
manu-
factures

wares, therefore, cannot be imitated elsewhere. The gloves are made from the skins of Hungarian sheep and goats.

The railways are not well organized, and the mileage is insufficient for the needs of the country. Ludwigs Canal (in Germany) connects the Danube with the Main, a navigable tributary of the Rhine; the Elbe is navigable from a point above Prague to the Baltic; the Moravian Gate opens a passage from Vienna northward; the Iron Gate, through which the Danube flows, is the route to the Black Sea; Semmering Pass and its tunnel is the gateway to the ports of the Adriatic. These great routes practically converge at Vienna, which also is the great railway centre of the empire.

The foreign trade consists mainly of the export of food-stuffs (of which sugar and eggs are heavy items), fine cabinet ware, woollen textiles (made from imported wool), barley and malt, and fine glassware. Much of the German and Italian wine is sent to market in casks made of Austrian stock; the coal goes mainly to Italy. The imports are raw cotton from the United States and Egypt, wool, silk, and tobacco. Coal is both exported and imported. The United States sells to Austria-Hungary cotton, pork, and corn—buying therefrom porcelain ware, glassware, and gloves.

Vienna, the capital, is the financial centre and commercial clearing-house of central Europe. It is situated at the intersection of medieval trade routes. *Budapest* is the great focal point of Hungarian railways and commerce. *Prague* controls the coal, textile, and glass trade of Bohemia. *Lemberg* is the metropolis of Galicia. The state of Liechtenstein is commercially under the control of Austria. *Trieste* and *Fiume* are the Adriatic ports; from the latter Hungarian wheat is exported.

The Lower Danube States.—Roumania and Bulgaria, the plain of the lower Danube, are enclosed by the Carpathian and Balkan ranges. They constitute a great wheat-

field whose chief commercial outlets are the Iron Gate into Germanic Europe, and the Sulina mouth of the Danube into the Black Sea. The growing of maize for home consumption and wheat for export form the only noteworthy industries. Most of the grain is shipped up the Danube and sold in Great Britain and Germany.

Com-
mercial
outlets

Movement
of grain

From the Iron Gate to the Black Sea the Danube is held as an international highway, and the control of its navigation is directed by a commission of the various European powers, having its head-quarters at Galatz, Roumania.

Control of
Danube
route



In the Balkan Mountains is the famous Vale of Roses which furnishes about half the world's supply of attar-of-roses. The petals of the damask rose are pressed between layers of cloth saturated with lard. The latter absorbs the essential oil, from which it is easily removed. About half a ton of roses are required to make a pound of the attar. *Kazanlik*, noted also for rugs, is the great market for attar. *Galatz* and *Rustchuk* are grain-markets and river-ports; from the latter a railway extends to *Varna*, the chief port of the Black Sea. From *Sofia*, near the Bulgarian frontier,

Attar-of-
roses

Markets

a trunk line of railway extends through Budapest to western Europe.

Turkey-in-Europe.—The European part of the Ottoman Empire is politically known as the "Sick-Man" of Europe. Its political existence is regarded as a necessity, in order to prevent the Russians from obtaining military and naval control over the Mediterranean and Black Seas, and therefore of the trade-routes between Europe and India. Its backward condition is due partly to bad government, but chiefly to the fact that its ports and trade-routes lead away from, and not towards, the great centres of commerce, while the Balkan Mountains are a barrier that separate it from the rest of Europe. Less than one-half the people are Turks; the greater part of the population consists of Armenians, Jews, Magyars, and Latins.

Most of the country is rugged and unfit for grain-growing. The internal government is bad, the taxes are so ruinous that the agricultural resources are undeveloped, and every sort of farming is primitive. In many instances the taxes levied on the crops become practical confiscation. Much of the cultivable land is idle for want of means to get the crops to market.

Grapes and wine, silk, opium, mohair and wool, valonia (acorn cups used in tanning leather), figs, hides, cigarettes, and carpets are the leading exports, and these about half pay for the American cotton textiles, woollen goods, coal-oil, sugar, and other food-stuffs imported. Choice Mocha coffee is imported for home use, and poorer grades are exported. Most of the foreign commerce is in the hands of English and French merchants. Armenians, Jews, and Greeks are the native middlemen and traders.

The native population is subject to the Sultan; most foreign residents are permitted by treaties to remain subject to the regulations of the consuls.

Reasons
for
political
existence

Reasons
for
backward
condition

Population

Drawbacks
to
agriculture

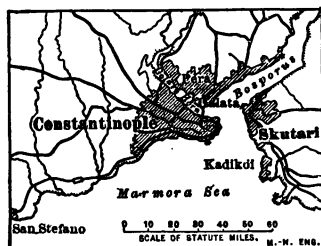
Exports

Imports

Control of
commerce

Status of
foreign
population

Constantinople is the capital. Its situation on the Bosphorus is such that under any other European government



HARBOR OF CONSTANTINOPLE

it would command a tremendous foreign commerce. It is naturally the focal point of the trade between Europe and Asia. A trunk line of railway connects the city with Paris. *Saloniki* is the port of western Turkey, and is likewise connected by rail with western Europe. A

Fortunate situation

Commercial connections

great deal of the foreign commerce of the state is now landed at this port.

The chief possessions of the Ottoman Empire are Asia Minor, Armenia, Mesopotamia, Syria, and Arabia.

Turkish possessions

Greece.—Greece is a rugged peninsula, no part of which is more than forty miles from the sea. The country is without resources in the way of coal, timber, or available capital. Its former commercial position, in ancient times, was due largely to the silver-mines near *Ergasteria*, and subsequently to the gold-mines of eastern Macedonia; these, however, are no longer productive.

Rugged surface

Reasons for former greatness

There is but little land suitable for farming, and not far from one-half the bread-stuffs must be imported. Much of the timber has been destroyed, and this has resulted in a deterioration not only of the water-power, but of the cultivable lands as well. The railway lines are short and their business is local; there are practically no trunk line connections with the great centres of commerce.

Drawbacks to farming

Railways

The harbors and the natural position of the country are its best remaining resources. The Greeks are born sailors, and the country is in the pathway of European and Asian commerce. Most of the grain-trade between the Black and

Reasons for sea-commerce

Greek
trade

Mediterranean Seas is controlled by Greek merchants, and the Greeks are everywhere in evidence in the carrying trade of the Mediterranean. The construction of the Corinthian canal has also given Greek commerce a material impetus.

Exports

Imports

Manu-
factures

Com-
mercial
centres

The chief exports are Corinthian grapes—commonly known as “currants”—fruit, and iron ore from Ergasteria. Great Britain, France, and Belgium are the chief buyers of the fruit-crop. The exports scarcely pay for the American cotton, Russian wheat, and the timber products that are purchased abroad. There has been a material growth in the manufacture of cotton, woollens, and silk in the past few years, much of the work being done in households. *Athens* is the capital and largest city. *The Piræus* and *Patras* are the chief ports.

Industries

Trade

Servia and Montenegro are stock-growing countries. The former has suffered greatly from misgovernment and the waste of its resources. Wine-cask stock and cattle are sold to Austria, which has five-sixths of its trade. *Belgrade* is its metropolis. Tobacco and live-stock are exported from Montenegro to Austria.

QUESTIONS FOR DISCUSSION

On a good map of central Europe trace an all-water route from the mouth of the Danube to the ports of the lower Rhine and the North Sea ; what connection have the cities of Ratisbon and Lemberg with this route?

How do the forests of these states affect the wine industry of Germany?

From the Statesman's Year-Book find the amount and movement of the exports and imports of these countries.

From the Abstract of Statistics find the volume of trade of these countries with the United States.

FOR COLLATERAL REFERENCE

Great Canals of the World—p. 4089.

A good map of central Europe.

CHAPTER XXIX

EUROPE-ASIA—THE RUSSIAN EMPIRE

THE great plain of Eurasia, which borders about half the circuit of the Arctic Ocean, is undivided by topographic barriers or boundaries. It is physically a unit.

Surface

Russia.—Russia comprises more than one-half the area of Europe; the Russian Empire embraces about one-half of Europe and Asia combined, and constitutes more than one-seventh of the land surface of the earth. From St. Petersburg to Vladivostok, the empire is six thousand miles wide. It has a similar position with respect to southern Europe and China as has Canada to the United States.

Area of empire

Comparative position

North of the latitude of St. Petersburg the climate is too cold to grow bread-stuffs; a large part of the country is, therefore, unproductive. The central belt is forest-covered; the southern part, or "black earth" belt, comprises the greater part of the productive lands, and this region is the chief granary of Europe. South of the latitude of Odessa, the climate is semi-tropical.

Unproductive area

Productive areas

Russia is an agricultural country. Maize and rye grown for home consumption, and wheat for export, are the chief products. Flax is a leading export product, and the Russian crop constitutes about four-fifths of the world's supply. Lands too remote from markets for grain-growing produce cattle and sheep, which are grown mainly for their hides and tallow. The wool of the Don is a very coarse textile that is much used in the manufacture of American carpets;

Grain

Flax

Cattle

Carpet wool

that of the arid plateaus of the southern country is a fine rug wool.

Ownership
of land

Com-
munal
land
ownership

Agriculture in Russia is on a much lower plane than in western Europe. Most of the land is owned in large estates. Individual farming is rare, land tillage being usually a community affair. A village community rents or purchases a tract of land, and the latter is allotted to the families composing it, a part of the land being reserved for pasture. The business is transacted by "elders," or trustees, who exercise a general management and supervision over the "mir," or community.

Drawbacks
to farming

The methods of farming are not the best, and an acre of land produces scarcely one-third as much as the same area is made to yield in other states. The farming class, or peasantry, was in a condition of serfdom until within a few years. Poverty unfits them to compete with farmers of western Europe; moreover, the laws of land ownership and tenure also serve to discourage farming.

Iron ore

Coal

Gold

Copper

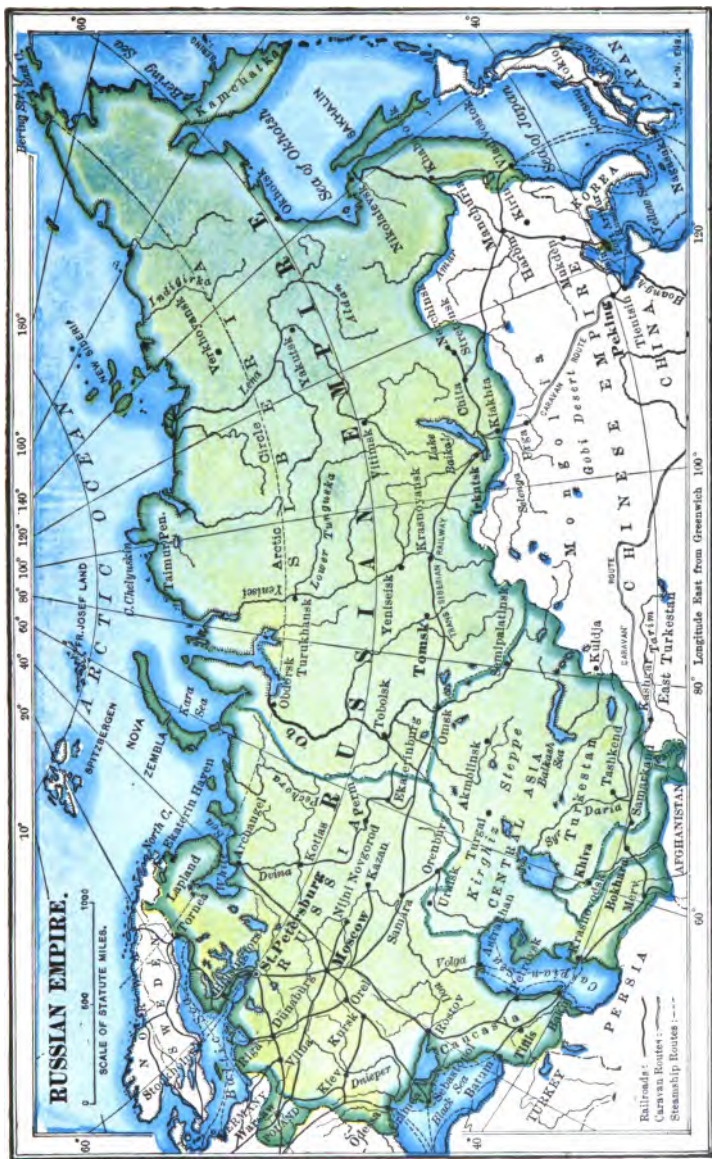
Platinum

Zinc

Petroleum

The metal and mineral resources are very great. There are extensive deposits of iron ore in southern Russia, in the Ural Mountains, and in Poland. Coal of good quality is plentiful, and coal mining is encouraged by a heavy tariff on foreign coal that enters regions where native coal is available. The most productive fields are those of the lower Don River and of Poland. The output of both coal and iron ore is increasing.

Gold is obtained in various parts of Siberia and in the Ural Mountains, but scarcely enough is mined for the requirements of coinage. Copper is also mined in the Ural and Caucasus Mountains. Most of the world's supply of platinum is also obtained in the Ural Mountains. Zinc and salt are extensively mined. The petroleum fields of Transcaucasia had a yearly output in 1910 of less than one-half those of the United States.



Forests The forest area is surpassed only by the timber belt of North America, both of which are in about the same latitudes. This area, within a very few years, is destined to be the chief lumber supply of all Europe. Moreover, the forests, the grain-growing lands, and the iron and coal constitute national resources which are surpassed in no other countries save the United States and China.

Wealth of resources

Steel manufacture The Russian Government has done much to encourage manufactures. Steel-making in the Ural district, in Poland, and in the iron regions of the Don has progressed to the extent that home-made railway material and rolling stock are now generally used. Farming machinery is made in the cities of the grain-growing region. The manufacture of cotton, woollen, and linen fabrics has developed to the extent that the state is becoming an exporter rather than an importer of such goods.

Textile manufactures

Railway construction Railway building has progressed under government aid, and about two-thirds of the 45,000 miles of track are owned by the state. The Transsiberian Railway connecting Vladivostok with the trunk lines of Europe was built by the state both for strategic and economic purposes. Large bodies of emigrants are carried into Siberia at nominal rates and are settled on lands that are practically free. The return cargoes consist of Chinese products—mainly silk textiles and tea—destined for western Europe.

Immigration

Exports

Strategic policy of acquiring territory A network of railways covers the grain-growing districts; trunk lines, mainly for strategic purposes, extend through Russian Turkestan to the Chinese border. For many years Russia has endeavored to acquire the territory that would afford commercial outlets to the Indian Ocean and into China. In this the state has been thwarted by two great powers—Great Britain and Japan. The construction of canals and the improvements of river-navigation are un-

Internal navigation

der government management, and the internal water-ways aggregate about thirty thousand miles of navigation.

The foreign commerce is changing in character as manufactures develop. Wheat, flour, timber products, flax, and petroleum are the chief exports. Cotton, tea, wool, and coal are the leading imports, the first-named coming mainly from the United States. Germany, Great Britain, France, Holland, and the United States are the chief countries which utilize Russian trade. The commerce between Russia and China is growing rapidly. The Trans-siberian railway is its chief northern outlet; and connecting lines extend through to the leading commercial centres of Manchuria, to Port Arthur, Peking, and to other points in China. A considerable amount of manufactured goods is sent to Asia Minor and the Iran countries.

Exports

Imports

Trade with Europe, United States, and China

Trans-siberian outlet

Trade with Iran countries

The most available ports opening into the Atlantic are on the Baltic Sea, but these are blocked by ice in winter; the best ports are on the Black Sea, but the Russians do not control the navigable waters that connect them with the Atlantic.

Ports

Much of the internal trade is carried on by means of annual fairs. The most important of these are held at *Nijni*, (lower) *Novgorod*, *Kharkof*, *Kief*, and other points. At the first-named fair goods to the amount of \$80,000,000 have changed hands during a single season, and the annual fair is the recognized common ground on which the oriental traders meet the buyers of European and American firms.

Annual fairs

Unlike the schemes of colonization of other European states, the various possessions of the Czar are practically in a single area, the dependencies being contiguous. The lines between them, with few exceptions, are political rather than natural boundaries.

Contiguity of dependencies

St. Petersburg, the capital, is the centre of finance and trade. *Riga* is the port from which most of the lumber is

Financial centre

Other
ports
and trade
centres

exported ; it receives the coal purchased from Great Britain for the factories of the Baltic coast. The harbor of Riga is not greatly obstructed by ice. *Archangel* has an export trade of lumber and flax during the few months when the White Sea is free from ice. *Odessa* and *Rostov* are the grain-markets of the empire. *Astrakhan* is the centre of trade for the Iran countries, and *Baku* is the petroleum-market. *Moscow* is the chief focal point of the railways ; and in consequence has become a great centre of manufacture and trade. *Warsaw*, next to *Moscow*, is the most important city.

Movement
of
population

Siberia.—This great territory resembles Russia in surface and climatic features. Like the former "west" of the United States, Siberia is the open "east" into which much of the surplus population of Russia, Germany, and the Scandinavian countries is moving, attracted by fine farming lands. The European emigrant becomes a producer when settled in Siberia, and, at the same time, a consumer of Russian manufactures. In five years more than one million people thus became occupants of the new country in Siberia. Russian trade is encouraged by a heavy tariff on foreign goods brought into Siberia.

Encour-
agement to
immigra-
tion

Com-
mercial
centres

Tobolsk, *Tomsk*, and *Semipalatinsk* are collecting stations for Siberian products, and each is built on navigable waters. *Irkutsk* receives the caravan trade that goes from Peking through *Urga* and *Kiakhta*, the frontier post of Chinese trade. *Vladivostok* is the great Pacific outlet and the terminus of the Transsiberian Railway. It is ice-bound in winter. *Harbin*, in Manchuria, China, is a Russian trading post of great commercial importance.

Trade of
vassal
states

Bokhara and **Khiva** are Russian vassal states. The former was acquired chiefly as a trade-route. A railway from *Krasnovodsk* on the Caspian Sea extends through *Merv*, *Bokhara*, and *Samarkand* to *Kashgar*, where it meets

the caravan trade from central China. The building of this railway has caused a great development of cotton-growing in these countries, which furnish Europe and America with the choice Afghan, Khiva, and Bokhara rugs.

Effects of
railway
construc-
tion

Transcaucasia, now joined to Russia, is a part of the plateau of Iran. A railway extends across the country from *Batum* to *Baku*, connecting the Black and Caspian Seas. Transcaucasia is the petroleum region of the East. It is also noted for the Shirvan, Kabistan, Daghestan, and Kazak rugs which are sold all over Europe and America. The so-called "Cashmere" rugs are not a product of Kashmir, but are made in the town of *Shemaka*. Kabistan rugs are made in *Kuba*. Kazak fabrics are usually the sleeping-blankets of the Kazak (Cossack) rough-riders.

Rug
products

QUESTIONS FOR DISCUSSION

How will the development of the coal, iron, and lumber resources most likely affect the industrial future of Russia?

Discuss the policy of Siberian immigration;—what are its advantages to German colonists?

From the map accompanying this chapter show how the tributary streams of the great rivers have served to extend Russian commerce through Siberia.

Note the situation of the cities and towns of Siberia with reference to the rivers.

What effect has the high latitude of Russia on its agricultural industries?

From the Statesman's Year-Book make a list of the leading exports and imports of Russia by articles, and also the volume of trade with other countries.

From the Abstract of Statistics find the statistics of trade between Russia and the United States.

FOR COLLATERAL READING AND REFERENCE

Commercial life in Russia—preferably from the article, "Russia," in the Encyclopædia Britannica.

For a rug of the Caucasus type, see illustration, p. 351; compare the Kabistan with the Persian piece—which has the floral and which the geometric figures?

CHAPTER XXX

THE IRAN PLATEAU AND ARABIA

Extent THE countries of the Iran plateau extend from the Mediterranean Sea to the valley of the Indus River. The Arabian Peninsula is not a part of it, but its climate and general character are similar. **Surface** The Iran countries are exceedingly rugged, and a great part of their surface is more



THE RUG-MAKING COUNTRIES

Climate than a mile above sea-level. The climate is one of great extremes; the summer hot-waves and the winter hurricanes are probably unknown elsewhere in severity. The greater part of Arabia is an uninhabitable desert.

The rigorous conditions of surface and climate have placed their stamp upon the population of the region.

They are full of the intelligent cunning and ferocity that mark people living under such conditions of environment. In many parts the sterile soil and arid climate force the sparse population into nomadic habits of life and predatory pursuits. For the greater part, the land hardly

Effects of
environ-
ment



AN ANTIQUE TREE-OF-LIFE, KERMANSHAH (PERSIAN) RUG

yields enough food-stuffs for the population, and any great development of agriculture is out of the question. The flood-plain of the Tigris and Euphrates, and a few of the river-valleys are highly productive.

Productivity

Before the Christian era several trade-routes between Europe and the Orient lay across this region, and along

Early
trade-
routes

Cities on
northern
route

Cities on
southern
route

the caravan routes there were the usual industries pertaining to commercial peoples. The cities of Sinope, Trebizond, Astrabad, Phasis, Mashad, and Bactra (now Balkh) grew into existence along one of the northern routes. Tyre, Nineveh, Tarsus, Palmyra, Babylon, and Persepolis were founded along one or another of the southern routes. Of these, Trebizond only retains its importance, being a seaport with a considerable trade. The commerce that



A KABISTAN RUG—CAUCASUS DISTRICT

Extinction
of
commerce

once passed over this route was crushed out of existence during the invasions by Jenghis Khan.

Rug
manu-
facture

Of the various industries of the Iran plateau, practically but one extends beyond its borders, namely, the manufacture of the textile fabrics known as Oriental rugs. These are unique; they are made of materials, colored with dyes, and are ornamented with designs that cannot be successfully imitated anywhere else in the world. The filling of the rugs consists of fine wool, selected not only from particular localities, but also from certain parts of the fleece. The dye-stuffs are common to other parts of the world, and

Rug
wool

their names—indigo, saffron, coccus, madder, and orchil—are familiar. But both the wool and the dye-stuffs possess qualities imparted to them by soil and climate that are not found elsewhere.

Dyes

Reasons
for
qualities

The absence of floors, and of the furniture found in European dwellings, make the rugs essential household articles rather than luxuries. The hearth-rug, the bath-mat, the divan-cover, the sleeping-blanket, and the saddle-mat must be regarded as necessities. Religion also has its requirements, and the prayer rug, sometimes ornamented with the hands of the Prophet, is a part of every household equipment, whether of the nomadic Arab or the wealthy merchant. Each district and people have their own designs and methods of workmanship, and the rugs of each are easily distinguished.*

Reasons
for uses
of rugs

For the greater part these are gathered by caravans and conveyed to convenient shipping-points. Nearly all the cottage-made product is obtained in this manner. As a rule the rugs are named from the town or district in which they are made. Smyrna and Constantinople are the chief ports of shipment. Many of them find their way to European dealers, but New York is probably the largest rug-market in the world. The great majority are retailed

Commerce
of rugs

Markets

* Persian rugs are the finest. As a rule the designs are floral and many of them contain legendary history worked in fantastic but beautiful patterns. Among those of especial merit are the Kermanshah tree-of-life fabrics, now somewhat rare. The rugs of Tabriz and Shiraz are also of high value. In general, Persian fabrics are characterized by very fine weaving, a short pile, and elaborate designs. Turkoman rugs are usually a rich brown or maroon in color, and are apt to contain slightly elongated octagonal figures. The Bokhara and Khiva-Bokhara, or Afghan rugs, are the best examples. The Baluchistan rugs are usually very dark in color, with bright red designs and striped ends of cotton warp. Turkish rugs are made almost wholly in Asia Minor or Anatolia. Large carpets of American and European designs are made at Ushak and Smyrna. "Smyrna" rugs are made in Philadelphia.

Character-
istics of
rugs

Rug
weaving

at from ten to fifty dollars each; choice fabrics bring from three hundred to ten thousand dollars. Oriental rugs are hand-woven, and a weaver may spend several years on a single piece, earning less than ten cents a day. The factory-made rugs are inferior to the cottage-made product in beauty, but they are durable.

Asian
possessions

Character
of
Armenian
peoples

Turkish Possessions.—Anatolia is the common name of the Turkish possession formerly known as Asia Minor. The name properly belongs, however, to only a small part of the region. The Asiatic possessions of the Ottoman Empire comprise Asia Minor, Armenia, Kurdistan, Syria, Mesopotamia, and Arabia. The Armenians are the commercial people of the greater part of this region, and although thousands have been massacred because of Turkish hatred of them, they practically wield the chief power because of their business enterprise.

Old
Roman
roads

Railways

Exports

During the Roman occupation many miles of roads were built from Constantinople and other coast-points to the interior. One of these extended to Mesopotamia, and became a much-travelled route of the trade which centred at Constantinople. Within recent years German capitalists have built railways along these roads, thereby creating a considerable export trade in fruit, rugs, and mohair cloth.

Trade
centres

Angora and *Konie* (*Iconium*) are important marts. *Trebizond* is the chief port of the Black Sea, but it lacks railway connections with the interior. *Smyrna* is the chief port of the Mediterranean, and from it are shipped to European and American markets the fruit and textile fabrics that have made its importance. In Syria, *Damascus*, one of the oldest cities in the world, is the centre of a considerable trade in textile manufactures. Rugs, dates, figs, and damask fabrics are exported to Europe through *Beirut*, its seaport, with which it is connected by rail. Much of the stuffs exported is gathered from Persia.

Yafa is the port of Jerusalem. *Bagdad* is the chief trade-centre of Mesopotamia.

Arabia.—Arabia is nominally a Turkish possession, but the coast-regions only are under the control of the Sultan. The interior is peopled by nomadic tribes, who do not acknowledge the sovereignty of Turkey. The province of Yemen, on the Red Sea, is about the only noteworthy part of the peninsula. Hides and Mocha coffee, gathered by Arab traders, are shipped from the port of *Hodeida*. *Mecca* is the yearly meeting-place of thousands of Muhammadan pilgrims, who go thither as a religious duty; it is also the centre from which Asiatic cholera radiates. *Aden*, a British coaling-station, is a free port, having a considerable trade in American cotton and coal-oil. Fresh water, the product of condensers, is sold to calling steamships. A railway from *Damascus* to *Medina* is operated chiefly for pilgrims to Mecca.

Turkish
provinces

Commer-
cial centres

Although Arabia is without commercial importance, the same cannot be said of the Arabic people. They are keen, thrifty traders. The commerce which connects the western part of Asia with Europe is largely of their making. They collect and transport the goods from the interior, delivering them to Jewish and Armenian middle-men, who turn them over to European and American merchants. Arab traders also control the greater part of the commerce of northern Africa. The slave-trade, which is wholly in their hands, is very largely the key to the situation. A party of slave-dealers makes an attack upon a village and, after massacring all who are not able-bodied, load the rest with the goods to be transported to the coast.

Arab
traders

Slave-
trade

Persia.—Persia is the modernized name of the province now called Fars, or Farsistan. Within its borders, however, the name Persia is almost unknown; the native people call the country Iran. In the times of Cyrus,

Origin of
name

Greatness of former times **Xerxes, and Darius, Persia was one of the great powers of the world.** The cultivable lands produced an abundance of food-stuffs. The mines of copper, lead, silver, and iron were worked to their utmost extent, and the chief trade-routes between Europe and the Orient crossed the country to the Indus River.

Results of Greek invasion The conquest by Alexander the Great changed the course of trade and diverted it to other routes, thus depriving the country of much of its revenue; the invasions of the Arabs left the empire a hopeless wreck. Iran blood dominates the country at the present time, it is true, but the religion of Islam does not encourage any material development, and the industries are now purely local.

Results of Muhammadan power There is no organization of trade, nor any system of transportation except by means of wretched wagon-roads with innumerable toll-gates. "Turkish" tobacco, opium, and small fruits are grown for export; silk and wool, however, are the most important crops. The former is manufactured into brocaded textiles; the latter into rugs and carpets. There are famous pearl-fisheries in the Persian Gulf.

Trade and manufactures

Rug-making centres *Tabriz*, situated in the midst of an agricultural region, has important manufactures of shawls and silk fabrics of world renown. The *Tabriz* rugs are regarded as among the finest of the rug-maker's art. *Shiraz*, the former capital, *Kermanshah*,* and *Hamadan* are noted for rug and carpet manufactures. *Mashad* is the centre of the trade with Russia. *Bushire* and *Bender-Abbas* are seaports, but have no great importance. Most of the trade with Russia passes through the port of *Trebizond*.

Ports **Afghanistan.**—The nomadic tribes that inhabit Afghan-

* The most valuable *Kermanshah* rug, now no longer made there, is the tree-of-life prayer-rug, an illustration of which is shown on p. 350. The design is emblematic of the story of the Garden of Eden.

istan have but little in common with the British civilization that is slowly but surely closing in upon them, and driving them from routes of commerce. A considerable local traffic is carried on between Bokhara and Herat, and between Bokhara and Kabul through Balkh, all being fairly prosperous centres of population in regions made productive by irrigation.

Effects of
British
occupation

Traffic

By far the most important route lies between Kabul and Peshawur, at the head of the Indus River. A railway, the Sind-Pishin, extends along the valley of this river from Karachi, a port of British India, to Peshawur, also in British India near the Afghan border, and the route lies thence through Khaibar Pass to Jelalabad and Kabul. A branch of this road is completed through Bolan Pass nearly to Kandahar.

Important
trade-
route

Kabul, the capital, is a military stronghold rather than a business centre, although it is a collection depot for the Khiva-Bokhara rugs and carpets that are marketed at Peshawur. *Kandahar* has a growing trade resulting from the railway of the Indus Valley. *Herat* is the market of the famous Herati rugs. There is no organized commercial system; a small amount of British manufactures—mainly stuffs for domestic use—are imported; rugs and dried fruit are the only exports to Europe and America. The imports enter mainly by way of Karachi, India; the exports are carried to Europe, for the greater part, by the Russian railway.

Commer-
cial and
strategic
centres

Imports
and
exports

The importance of Afghanistan is due to its position as a buffer state between Russia and British India. The various strategic points for years, therefore, have been military strongholds. There is an old saying: "Whoso would be master of India must first make himself lord of Kabul." The meaning of this is seen in the history of Khaibar Pass, which for many years has been a scene of slaughter; indeed, it has been the chief gate-way between

Reasons
for
importance

Khaibar
Pass

British
protec-
toracy

occidental and oriental civilizations for more than twenty centuries. Since the acquisition of India by Great Britain Afghanistan has been under British protectoracy.

Surface
features

Baluchistan.—The general features of Baluchistan resemble those of the other parts of the Iran plateau. The coast has no harbors in the proper sense, but the anchorage off *Gwador* has fair protection from storms and heavy winds. The few valleys produce enough food-stuffs for the half-savage population. There is but little organization to the government save that which is military in character. The state is a protectorate of Great Britain.

Political
organiza-
tion

Military
outlet

Rug-making is the only industry that connects Baluchistan with the rest of the world. *Quetta*, the largest town, is a military station controlling Bolan Pass. Its outlet is the Kandahar branch of the Sind-Pishin Railway.

QUESTIONS FOR DISCUSSION

What climatic factors prevent these countries from being regions of great production?

How do climate and soil affect the character of the wool clip?

How do Arabian horses compare with American thorough-bred stock with respect to usefulness?—how do they compare with the mustang stock?

Why is Khaibar Pass regarded as the key to India?

FOR COLLATERAL READING AND REFERENCE

From a cyclopædia (or from McCarthy's *History of Our Own Times*) read an account of the British disaster at Kabul.

Study, if possible, one or more rugs of the following kinds, noting the colors, designs, and warp of each: Bokhara (antique and modern), Anatolian, Kermanshah, and Baluchistan.

CHAPTER XXXI

BRITISH INDIA AND THE EAST INDIES

THESE countries are in tropical latitudes and in the main are regions of great productivity. A few native states that have resisted annexation and conquest excepted, almost the entire area is divided among Great Britain, Holland, and France. Political status

British India.—The Empire of India comprises an area half as large as the United States, situated on the southern Situation



slope of Asia. It covers the same latitude as the span between the Venezuelan coast and the Ohio River; from the Indus to the Siam frontier the distance is about two thousand miles. It includes also settlements in the Malay peninsula. Extent

Excepting the plateau of the Dekkan, and the slopes of

Drainage the Himalayan ranges, most of the surface consists of plains and low, rolling land covered with a great depth of soil. Through these rich lands flow four large rivers—the Indus, Ganges, Brahmaputra, and Irawadi, which afford a great deal of internal communication. The Himalaya Mountains on the north and the Hindu Kush on the northwest

Montane barriers practically shut off communication from the northward, so that all communication in this direction is concentrated at Khaibar and Bolan Passes, the most important gateways by land approach.

Density of population British India is one of the most populous regions of the world; the average population per square mile is about one hundred and eighty, a density considerably greater than that of New York State. The entire population is about three times that of the United States. Nearly all the food-stuffs grown are required for home consumption; indeed, dry years are apt to be followed by a shortage of food-stuffs. Years ago famines followed any considerable deficiency of crops, but since the completion of the admirable railway systems the necessary food-stuffs are quickly shipped to the district where the shortage occurs.

Consumption of food-stuffs

Railways a prevention of famines

The Hindus constitute about three-fourths of the population. Along the northern border there are many peoples of Afghan and Turkic descent; in Burma there is a considerable admixture of Mongol blood. An elaborate system of social castes imposed by the teachings of Brahmanism has made the introduction of western methods of education and civilization somewhat difficult to carry out. The educational system of the dominating Brahmanic caste, although of a very high order, does not fit the people to cope with the commercialism of western civilization.

Character of population

Caste

Educational unfitness

Occupations Five-sevenths of the population are engaged in agricultural labor. Rice, wheat, millet, meat, and sugar are the

chief food-crops. Of these, small amounts of rice and wheat are exported; the others are required for home consumption.

The articles grown for export are jute, cotton, oil-yielding seeds, tea, and opium. The opium is a government monopoly, and is sold mainly in China. No meat is exported, but hides form a large item of foreign trade. Exports

The jute is used in the manufacture of rugs and grain-sacks. It is cultivated mainly in the delta-lands of the Ganges-Brahmaputra. A considerable part of the product is now manufactured in India and in China; some is also shipped to California, to be made into wheat-sacks; perhaps the larger part is sent to Dundee, Scotland, where it is woven into textile fabrics. The choicest product is used to mix with silk fibre, or is employed in the manufacture of rugs and coverings. Utilization of jute

Cotton cultivation is rapidly taking first rank among the industries of India, for which the conditions of soil, climate, and market are admirably adapted. India stands second in cotton-growing, and the area of production is gradually increasing. Most of the crop is exported to Europe for manufacture, although there is an increasing amount sold to Japan. Great Britain is the largest purchaser, and the cotton goods manufactured at Manchester are reshipped in large quantities to India. Cotton production
Cotton markets

Owing to the low wages paid for labor both in the fields and the mills, cotton manufacture is a rapidly growing industry in India. In many cases the yarn is manufactured in India and then sent to China to be made into coarse cloth. Some of the mills are equipped with machinery made in the United States. Cotton manufactures

Tea has become one of the most important crops of India. It is grown mainly in Ceylon and Assam, and is said to have grown wild in the latter state. The quality Tea production

Quality
of tea

of Indian tea is regarded as superior to the Chinese product, and Indian teas have therefore very largely supplanted those of China, in British consumption.

Silk
production

Silk cultivation and manufacture have been growing rapidly in the past few years; a considerable part of the product is "tussar," or wild silk. The silk rugs of India are not equalled anywhere else in the world. Wool is a product of the mountain-regions, but is almost wholly used in the manufacture of rugs and coverings.

Wool
production

Character
of British
occupation

The British occupation of India is commercial rather than political. India furnishes a most valuable market for British manufactures; it supplies the British people with a large amount of raw material for manufacture. The general government is administrative only so far as the construction of railways, irrigating canals, and harbors, and the organization of financial affairs are concerned.

Political
organization

There are about two hundred and fifty native states included within the territory of British India. In addition to the native ruler, a British governor or magistrate carries out the administrative features of the British Government. For administrative purposes most of the native states are grouped into eight provinces, or "presidencies."

Agri-
cultural
products

Bengal.—The states of Bengal, mainly in the valley of the Ganges River, produce most of the rice and wheat.

Commer-
cial outlet

Calcutta, the capital of the empire, is a comparatively young city. The Hugli at this point is navigable both for ocean and river craft. The situation of the city is much like that of New York, and it is therefore finely adapted for commerce.

Railways

Railways extending from the various food-producing districts and from other centres of commerce converge at *Calcutta*. The city is not only the centre of administration, but the chief focus of commerce and finance as well.

Adminis-
trative
centre

Bombay.—Bombay includes a number of states bor-

dering on the Arabian Sea. The city of *Bombay* is built on an island of the same name. Its situation on the west coast makes it the most convenient port for the European trade that passes through the Suez Canal. The opening of the route gave Bombay a tremendous growth, and it is destined to become a great commercial factor in Indian Ocean trade. It is also a great manufacturing centre for cotton textiles. *Ahmedabad*, a military station, is also an important centre of cotton manufacture and wheat-trade.

Situation
on famous
trade-
route

Sind.—The native state Sind includes the greater part of the basin of the Indus. Its importance is military and strategic rather than commercial. The ability of Great Britain to hold India depends very largely on British control of the Indus Valley and the passes leading from it. The Sind-Pishin Railway traverses the Indus Valley from Karachi to Peshawur. *Haidarabad*, one of the largest cities of India, is the centre of an agricultural district. *Karachi*, the port near the mouth of the Indus, next to Khaibar Pass, is the most important strategic point of India, and one that the Russians for more than a century have been trying to possess.

Strategic
value

Punjab.—The states of the Punjab are mainly at the upper part of the Indus. *Amritsar* is an important centre for the manufacture of silk rugs and carpets. A large number of these are sold in the United States at prices varying from two hundred to six thousand dollars. Many of the designs for these textiles are made in New York. *Peshawur* is important chiefly as a military station.

Coveted
by
Russians

Burma.—British Burma includes the basin of the Irrawadi River. The uplands are wheat-fields; the lowlands produce rice. *Mandalay* is a river-port and commercial centre. *Rangoon* is the seaport, with a considerable ship-building industry that results from the teak forests.

Rug
manu-
factures

Products
Commer-
cial centres

Although the Irawadi is navigable for light craft, railways along the valley have become a necessity; these centre at Rangoon.

Population and products The province of Madras is one of the most densely peopled parts of India. The chief commercial products are cotton and teak-wood. *Madras*, its commercial centre, has a very heavy foreign trade in hides, spices, and cotton. **Commercial centre** The cotton manufactures are extensive. A yarn-dyed cotton cloth, now imitated both in Europe and the United States, has made the name famous.

Situation **Kashmir.**—The native state Kashmir, situated high on the slopes of the Karakorum Mountains, is known chiefly for the "Cashmere" shawls made there. The shawls are hand-woven and represent the highest style of the weaver's art. The best require many years each in the making; they command prices varying from five hundred to five thousand dollars. This industry centres at *Srinagar*. **"Cashmere" shawls**

Benefits of free ports **Other British States.**—The Straits Settlements are so called because they face the Straits of Malacca. They include several colonies, chief of which are Singapore, Penang, and Malacca. The Straits ports are free from export and import duties, a regulation designed to encourage the concentration of Malaysian products there—in other words, to encourage a transit trade.

Volume of transit trade The policy has proved a wise one, and the trade at the three ports—*Singapore*, *Penang*, and *Malacca*—aggregates about six hundred million dollars yearly. About two-thirds of this sum represents the business of Singapore. Tin constitutes about half the exports, a large share going to the United States. Spices, rubber, gutta-percha, tapioca, and rattan constitute the remaining trade. Rice, cotton cloth, and opium are the imports. **Exports**

Other possessions The Federated Malay States, situated in the Malay peninsula, and the northern part of Borneo are also British

possessions. Their trade and products are similar to the rest of the Malaysian possessions.

Dutch East India.—The Dutch possessions include nearly all the islands of the Malay Archipelago and the western part of New Guinea. Of these, Java and Sumatra are the most important. They are divided into “residencies,” and the administering officers exercise control over the various plantations. In addition, there are numerous private plantations. The colonial administration is admirable.

Extent

Method of
adminis-
tration

Cane-sugar, coffee, rice, indigo, pepper, tobacco, and tea are the chief products. The sugar industry has been somewhat crippled by the beet-sugar product of Europe. Java and Sumatra coffees are in demand all over Europe and the United States. Sumatra wrappers for cigars find also a ready market wherever cigars are manufactured. The cultivation of cinchona, or Peruvian bark, has proved successful, and this substance is becoming an important export. The islands of Banka and Billiton (with Riouw) yield a very large part of the world's supply of tin, much of which goes finally to the United States. The mother-country profits by the trade of these islands in two ways: the Dutch merchants are practically middlemen who create and manage the commerce; the Dutch Government receives an import tax of six per cent., and a small export tax on nearly all articles except sugar. *Batavia* is the focal point of the commerce.

Export
productsAn
imported
industry

Tin mines

Economy
of Dutch
methods

Siam.—This kingdom is chiefly important as a buffer state between French and British India, and little by little has been pared by these nations until practically nothing but the basin of the Menam River remains. The administration of the state is progressive, and much of the resources have been developed in the last few years.

Value as
a buffer
state

Rice and teak are the leading products. The rice is

Rice cultivation	cultivated by native laborers—much of it by enforced labor—and is sold to Hongkong, British India, and the more northerly states. It is collected by Chinese middlemen, and by them sold to British and German exporters. The teakwood business is managed by British firms. The
Teakwood industry	logs are cut by natives, hauled to the Menam River, and floated to Bangkok; there they are squared and sent to
Trade- route and centre	European markets. Pepper and preserved fish are also exported. The Menam River is the chief trade-route, and <i>Bangkok</i> , at its mouth, is the focal point of trade.

Situation and extent	French India. —The French control the region south of China, called French Indo-China, together with various areas in the peninsula of Hindustan; of these Pondicheri and Karical are the most important. Indo-China includes the basin of Mekong River, and rice is the staple product. The most productive rice-fields are the delta-lands of the Mekong, formerly known as Cochin-China.
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Exports	From these lands more than half a million tons of rice are exported, the product being sold mainly at Hongkong and Singapore. Pepper is also an export of considerable value. France, China, and the Philippine Islands are the final destination of the rice export. The imports are
Imports	mainly textiles, machinery, and coal-oil from the United States. The machinery pertains chiefly to the manufactures of cotton and silk textiles. On account of cheaply mined coal, there is a considerable growth of this industry. <i>Saigon</i> is the business centre and port at which the Chinese
Trade centre	middlemen meet the European merchants and forwarders.

QUESTIONS FOR DISCUSSION

What have been the chief effects of the British occupation of these countries, so far as the natives are concerned?

What is the position of Khaibar Pass with respect to the commerce of India?

How has the building of the Sind-Pishin Railway strengthened British occupation of India?

Singapore and Batavia are the two great focal points of trade in the East India Islands. At the former all trade is absolutely free; at the latter there is both an import and an export tax. What are the advantages of each policy?

From the Abstract of Statistics find the trade of the United States with these countries.

FOR COLLATERAL READING AND REFERENCE

From a cyclopædia, preferably the Encyclopædia Britannica, read the following topics:

Caste

Lord Clive

Rattan

Pepper

CHAPTER XXXII

CHINA AND JAPAN

Relative
position

THE relative position of China, Russia, and Japan is not unlike that of continental Europe and Great Britain, and the struggle for supremacy in the Japan and Yellow Seas is about the same as that which in times past took place in the North Sea. In the latter case France and Holland were the disturbing powers; in the former, it is Russia.

Geographic
conditions
like those
of United
States

The Chinese Empire.—A comparison of the Chinese Empire with the United States shows that the two countries have about the same position and extent of latitude. There is also about the same proportion of highlands, arid lands, and fertile lowlands. The similarity of the two countries in geographic conditions is very marked.

Density of
population

The fertile lowland in the east and southeast, corresponding to the Atlantic and Gulf coasts of the United States, is one of the most productive regions in the world; on account of its productivity it is densely peopled. The arid and mountain lands are peopled mainly by nomadic cattle-herders.

Agri-
cultural
products

China is an agricultural country; the farms are held by individual owners, but the holdings are so small that agricultural machinery is not required for their cultivation.

Wheat, millet, and pease are grown throughout the lowlands wherever they can be cultivated. The cultivation of rice is confined mainly to the coast lowlands. The amount of food-stuffs produced, however, is scarcely sufficient for home consumption; indeed, a considerable amount is imported, and the imports year by year are increasing. This

is due not so much to the density of population as to want of means of transportation of the crops from inland regions. It is often cheaper to import food-stuffs from abroad than to transport them from a nearby province.

Tea is extensively cultivated, and China exports nearly one-half of the world's product; the total amount produced is considerably more than half. Most of this goes to Great Britain and Canada. Raw silk is an important product, and the mulberry-tree is extensively grown. Cotton is an important crop, especially along the lower Yangtse. It is a garden-crop, and nearly all of it is consumed. In the northern provinces, especially in Manchuria, wheat, millet, and the bean, used in making soy and "worcestershire" sauces, are cultivated. The wheat and beans are exported, mainly over the Russian railways.

Exports

The mineral wealth is very great, and with proper management will make China one of the most productive and powerful countries in the world. Coal is found in every one of the provinces, and the city of Peking is supplied with an excellent quality of anthracite from the Fang-shan mines, a few miles distant. The coal-fields are the most extensive known. Iron ore of excellent quality is abundant, and in several localities, notably in the province of Shansi, the two are near each other. Tin is the most important mineral mined for export. It is obtained in Yunnan, and sent to Hongkong for export.

Mineral resources

Foreign capitalists are seeking to develop these resources. The Germans have obtained mining concessions in Shantung peninsula, and these involve the iron ore and coal occurring there. The Peking syndicate, a London company, has also obtained a coal-mining concession in Shansi.

Foreign development

For the greater part the manufactures are home industries. Until recently most of the cotton cloth was made by means of cottage looms, and the beautiful silk brocades

Home industries



which are not surpassed anywhere else in the world are still made in this manner. Porcelain-making is one of the oldest industries, and to this day the wares sold in Europe and America are known as "china." Straw carpet, or matting, and fans for export are also important exports.

The mill system of manufacture is rapidly gaining ground, however, and foreign companies find it economical to carry the yarn made in India from American cotton to China to be made into cloth. In the vicinity of Shanghai alone there are nearly three hundred thousand spindles. The textile industry depends largely upon cheap labor; the Chinese skilled laborer is intelligent; he does not object to a sixteen-hour working-day at wages varying from five to twenty cents.

Manu-
factures

Labor

There is no great localization of industrial centres, as in the United States and Europe. Each centre of population is practically self-supporting and independent from an economic stand-point. The introduction of western methods, and the construction of railways are gradually changing this feature.

All industries of a general character are hampered for want of good means of transportation. The empire is traversed by a network of unpaved roads; but although these are always in a wretched condition, an enormous traffic is carried over them by means of wheel-barrow, pack-animals, and by equally primitive methods.

Means of
trans-
portation

The numerous rivers form an important means of communication. The Yangtse is now available to commerce a distance of 2,000 miles, and the opening of the Si Kiang (West River) adds a large area that is commercially tributary to Canton and Hongkong. The most important water-way is the Grand Canal, extending from Hang Chow to Tientsin. This canal is by no means a good one as compared with American and European

Rivers

Grand
Canal

Grand
Canal

standards. It was built not so much for the necessities of traffic, as to avoid the numerous pirate vessels that infest the coasts. Junks, row-boats, house-boats, and foreign steam craft are all employed for traffic. The internal water-ways aggregate about fifteen thousand miles in length.

Railways

At the close of the nineteenth century there were less than four hundred miles of railway; at the end of 1910, however, not far from four thousand miles were in oper-



A TEA-PLANTATION—PICKING THE LEAVES

ation. The Chinese Eastern connects Peking with the Transsiberian Railway system. One may now go from Paris to Port Arthur and Peking with not more than one or two changes. A line connects Peking and Hankau, and its extension to Hongkong is under construction. Another line will follow the old caravan route from Peking to Urga.

Telegraph
lines

Telegraph and telephone lines have become popular and have been extended to the interior a considerable distance.

The most important is a direct overland line between Peking and European cities. Inasmuch as there are no letters in the Chinese language, the difficulties in using the Morse code of telegraphy are very great. In some cases the messages are translated into a foreign language before they are transmitted; in others, a thousand or more

Difficulties
in making
code



PREPARING THE LEAVES FOR
ROASTING



TEA-BALES FOR EXPORT THROUGH
RUSSIA

words in colloquial and commercial use are numbered, and the number is telegraphed instead of the word.

Most of the business between the natives and foreigners is carried on by means of middlemen, or "compradors," and these include both the merchants and the native bankers. The merchants are intelligent and thrifty, having few if any superiors among the merchants of western nations. A very large part of the retail trade of the

Middlemen

Merchants

Philippine Islands and the East is carried on by Chinese merchants.

Extent

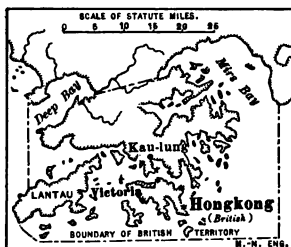
The Chinese Empire is nominally a republic. It consists of China proper and five dependencies.

STATE	POPULATION	CAPITAL OR CHIEF TOWN
China proper.....	380,000,000	Peking
Manchuria	7,500,000	Kirin
Tibet.....	6,000,000	Lassa
Mongolia	2,000,000	Urga
Jungaria	600,000	Kur-kara-usu
Eastern Turkestan	600,000	Yarkand

The five dependencies are mainly arid, unproductive, and sparsely peopled. Their chief importance consists in the fact that they are "buffer states" between China proper and European possessions. They produce little except meat, wool, and live-stock.

Political
importance

China proper is divided into provinces, each governed



Political
adminis-
tration

by a viceroy who is responsible to the general government. All business with foreign powers is transacted through a Foreign Office. The internal government is nominally managed by a council, but it is shaped largely by the influence of the United States

and various European powers. The government is in a transitional stage.

Until within a few years China nominally allowed no foreign traders within her borders; recently, however, about forty cities, commonly known as "treaty ports," have been opened to the trade of foreign countries. Goods

Treaty
ports

going inland any distance are required to pay a "liken" or internal tariff at the border of each province.

Several concessions of territory within recent years have been forced from China by foreign powers: thus, Great Britain has Hongkong Island (with the peninsula of Kaulung) and Weihaiwei; Germany has Kiaochow on the bay of the same name; France has Kwang chau wan harbor. These concessions carry with them the control of the port and surrounding territory. The German concession includes the right to mine coal and iron, and to build railways within a territory of much larger extent. At the close of the war between Russia and Japan, the latter acquired Port Arthur, the gateway to Manchuria.

Territorial
concessions
to foreign
powers

Whatever may be the political significance of the opening of the treaty ports and the granting of the various concessions, the effect has been to increase the trade of the United States with China about twenty-fold. The imports from the United States consist mainly of cotton and cotton cloth, coal-oil, and flour. The chief exports to all countries are tea, silk goods, and porcelain ware. Most of those sent to the United States are landed at Seattle or San Francisco. Great Britain, through the port of Hongkong, has a larger trade than any other nation. Japan and the United States have most of the remaining trade.

Increase of
trade with
United
States

Imports

Exports

Ports of
Chinese
trade

Because of the great population, about four hundred millions, China is the chief consumer of cotton textiles; the United States, on the other hand, is the chief producer. Moreover, the relative geographic position of the two is such that the Americans can supply not only the cotton textiles, but the raw cotton as well, more economically than can any other nation.

Reasons
for trade in
American
cotton

Peking, the capital, is politically but not commercially important. The part occupied by the foreign legations is modern and well kept. *Tientsin*, the port of Peking, has

Trade
centres

Trade
centres

most of the commercial business. *Canton*, the largest city of the empire, and *Hongkong*, are the commercial centres of nearly all the British trade. Most of the American and Japanese trade centres at *Shanghai*. *Hankau*, a great tea market, sometimes called the Chicago of China, is the farthest port of the Yangtse reached by ocean-going vessels, but river steamers go to *Ichang*, the farthest treaty port inland. *Niuchwang*, on the Manchurian frontier, is important mainly as a strategic point. *Chinkiang* and *Tientsin* are terminal ports of the Grand Canal. *Macao*, a Portuguese possession, is the open door of Portugal into China.

Closed
doors of
Tibet

Products
of
Mongolia

Products
of
Turkestan

Products
of
Manchuria

The inland divisions of the Chinese Empire have but little commercial importance. Musk, wool, and skins are obtained from Tibet, into whose capital, *Lassa*, scarcely half-a-dozen Europeans have penetrated. The closed condition is due to the opposition of the Lamas, an order of Buddhist priests. Mongolia is a grazing region that supplies the Chinese border country with goats, sheep, and horses. It also supplies the camels required for the caravan tea-trade to the Russian frontiers. Eastern Turkestan is mainly a desert. *Kashgar*, the metropolis of the fertile portion, is the exchange market for Chinese and Russian products. Most of the mineral known as jade is obtained there. Manchuria is a grazing and wheat-growing country, exporting food-stuffs and ginseng into China. *Harbin*, a Russian trading post, is connected with Peking and with European cities by railway. *Dalny*, now named *Tairen*, is an important port of Japanese trade.

Compara-
tive
position

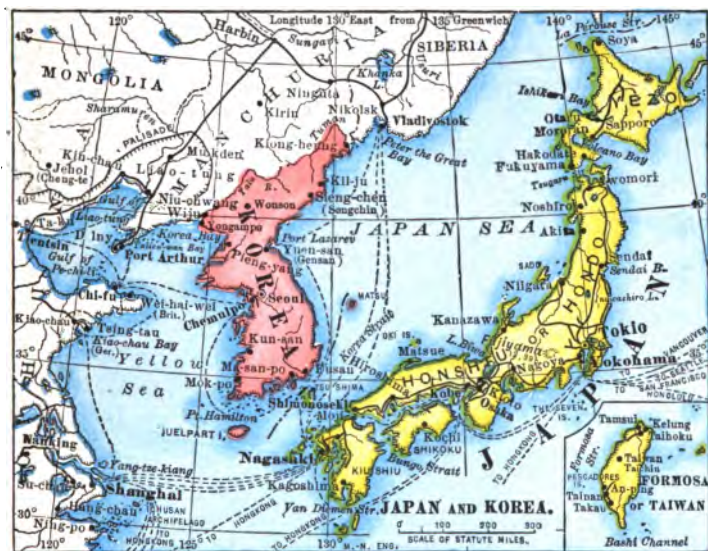
Japan.—Japan is an insular empire, the commercial part of which has about the same latitude as the Atlantic coast of the United States; the empire extends from Formosa to Kamchatka. It is sometimes called the "Great Britain of the East," and the people are also called the "Yan-

kees of the East." Structurally, the chain of islands consists of ranges of volcanic mountains. The abundant rains, however, have made many fertile river-valleys, and have fringed the islands with coast-plains.

Surface features

Since the opening of Japan to foreigners the Japanese have so thoroughly adapted themselves to western commercial methods that they have become the dominating

Results of adopting western methods



power in eastern Asia. Their influence has been greatly strengthened by a treaty for defensive purposes with Great Britain. A most excellent army and a modern navy, not surpassed elsewhere, make the alliance a strong one. The Japanese have also an excellent public school system.

With a population of more than half that of the United States, occupying an area not larger than the State of California, every square foot of available land must be culti-

Density of population

Products

vated. Yet the Japanese not only grow most of the food-stuffs they consume, but are able to export rice. There is scant facility for growing beef cattle, but fish very largely



NATIVE PLOUGHING RICE-FIELDS

takes the place of beef. The cattle grown are used as draught-animals in farm labor. Ordinary dairy products are but little used.

Rice, tea, and silk are the staple crops. Rice is grown

on the coast low-lands, the west or rainy side* producing the larger crop. The Japanese rice crop is so superior that the larger part is exported, while an inferior Chinese



IRRIGATING A RICE-FIELD

grain is imported for home consumption. The quality of the Japanese rice is due to skilful cultivation.

*The islands are mainly in the belt of prevailing westerly winds. More rain, therefore, falls on the west than on the east coasts.

Rice crop

Tea has become the staple crop, and is cultivated from Formosa to the forty-fifth parallel. Tea-farms occupy nearly every acre of the cultivable hill-side areas in some of the islands, and the soil is enriched with a fertilizer made from fish and fish refuse, dried and broken. Most of the tea product is made into green tea, and on account of its quality it commands a high price. Formosa tea is considered the best in the market.

Tea
cultivation

Silk culture is confined almost wholly to the island of



RICE-FIELDS

Hondo. The raw silk is of superior quality, and the exported material is used mainly in the manufacture of ribbons and brocades. A limited amount of cotton is grown, but the staple is short, and its cultivation is not profitable except in a few localities.

Silk
cultivation

Among the forests there is comparatively little timber suitable for building purposes, and much of the lumber is purchased from the mills of Puget Sound. Bamboo is largely employed for buildings, as well as for nearly every

Timber

**Camphor
product**

other purpose for which wood is used. Camphor is the product of a tree (*Camphora officinarum*) allied to the cinnamon and the sassafras. It is cultivated in the island of Kiushiu. The best gum, however, is now obtained from Formosa, and this island now controls the world's supply. The camphor product is a government monopoly leased to a British company.

**Lacquer
product**

The lacquer-tree (*Rhus vernicifera*) grows mainly in the island of Hondo. The sap, after preparation, forms the most durable varnish known. Black lacquer is obtained by treating the sap with nutgalls. Lacquered woodenware is sold all over Europe and the United States. The lacquered surface is exceedingly hard and waterproof; it is not affected by climate.

**Metal
products**

Gold, porcelain clay, silver, copper, and petroleum are mined. The gold and silver are used both for coinage and in the arts; the clay has made Japanese porcelains famous. The copper comes from the most productive mines of Asia; a considerable amount is exported, but much is used in the manufacture of Japanese bronze goods. Coal is mined, and this has given a great impetus to manufacture; iron ore is deficient, and steel must be imported. The quantity of petroleum is increasing yearly, and is becoming an important factor in the world's product.

**Coal and
petroleum****Cotton
manu-
factures**

Manufacturing industries are giving shape to the industrial future of the country. The cotton-mills alone employ seventy thousand people and keep nearly two million spindles busy. About one million operatives are engaged in textile manufactures. Much of the cloth, both cotton and silk, is still woven on cottage looms. The cotton cloth is sold mainly in China and Korea; the surplus silk textiles find a ready market in the United States. The best straw matting used as a floor-covering is now made in Japan and constitutes a very important export.

**Silk manu-
factures****Straw
carpet
manu-
factures**

One thousand miles of railway aid the internal industries of the country ; several steamship lines to Hongkong and Shanghai, and one or more each to Vladivostok, Bombay, San Francisco, Seattle, Honolulu, Australia, and Vancouver (B. C.) carry the tea, raw silk, and manufactured products to Europe and America. Much, if not most, of the steamship interests are owned by the Japanese, and the lines are encouraged by government subsidies. France and the United States buy most of the raw silk. The latter country purchases most of the tea, sending coal-oil, cotton, leather, and lumber in return. Great Britain and Germany sell to the Japanese a large part of the textiles and the machinery they use. The exports to the United States are consigned mainly to San Francisco, New York, and Seattle.

Railways

Steamship
linesDestina-
tion of
exports

Tokyo, the capital and financial centre, has about the population of Chicago. *Yokohama* is its harbor and the chief port of American trade. *Nagasaki* is the chief Japanese naval station and the port of Chinese trade. Its ship-building yards are among the best in the world. *Osaka*, with a population of more than one million, is the chief centre of manufacture of textiles. *Kyoto* is noted for textile and porcelain manufactures—the latter, on “Teapot Hill.” *Nagoya* is famed for bronze and art manufactures. *Kobé* is the port of these cities, and a circle inclosing them contains a large part of the population of Japan. *Shimonoseki* is a port of Korean trade. *Hakodate*, the northerly port of the empire, is a fishing station.

Ports and
trade
centres

Korea, for many years a vassal state of China, became nominally independent after the war between Japan and China. The independence of the state was merely a shadow, however, for the Japanese were the real rulers. In 1909 the Koreans gave the Japanese control of police regulations, and in the following year Korea was formally annexed to Japan under the name of Chosen.

Acquisition
of Korea

Products

Ports and
trade
centres

Korea is an agricultural country. Grain of all kinds is grown, mainly for home use. Rice, cotton, soy beans, and gingseng are cultivated for export. The forests of the Yalu River basin furnish excellent building timber, and the cutting of the timber by the Russian companies was a cause of the war between Russia and Japan. A gold mine is operated by an American company, and the gold is exported. *Seoul* is the capital and *Chemulpo*, its port, is connected with it by a railway. *Fusan*, opposite *Shimonoseki*, is the port of Japanese trade.

QUESTIONS FOR DISCUSSION

How has the policy of seclusion affected the commercial development of China?

What has been its effect on the social life of the people?

How did the cultivation of opium in India become a factor in the opening of China to foreign trade?

What is meant by "treaty ports"? Make a list of those shown on the map of eastern China.

Name two Chinese statesmen who have been factors in the relations between China and the United States.

Compare the position of Japan with that of the British Isles with reference to commerce.

What advantages has Japan with reference to latitude?—what disadvantages with reference to cultivable lands?

From the Statesman's Year-Book find the leading exports and imports and the volume of trade of these states.

From the Abstract of Statistics find the leading articles of trade between these states and the United States.

FOR COLLATERAL READING AND REFERENCE

From a cyclopædia read the following topics: The opium war, Commodore Perry's expedition.

CHAPTER XXXIII

AFRICA

AFRICA is in a state of commercial transition. During the last quarter of the nineteenth century the partition of its area among European nations left but few of the names that formerly were familiar. At the beginning of the twentieth century the British, French, and Germans controlled the greater part of the continent, although the Portuguese, Belgians, Italians, and Spanish have various possessions.

Control by
European
powers

The partition of Africa was designed for the expansion of European markets. The population of Africa is about one hundred and seventy million, and the continent is practically without manufacturing enterprises. The people, therefore, must be supplied with clothing and other commodities. In 1910 the total exports of Africa aggregated about five hundred millions of dollars, of which the United States had not much more than one per cent., mainly cotton cloth and coal-oil.

Character
of
population

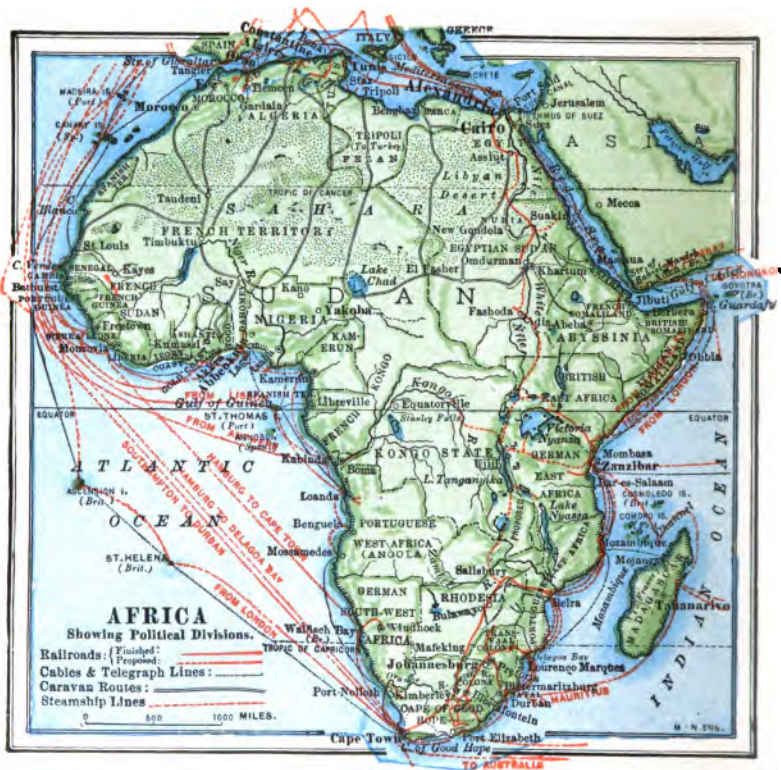
Volume
of trade

Egypt.—The Egypt of the maps is a region of indefinite extent so far as its western and southern boundaries are concerned; the Egypt of history is the flood-plain of the Nile. From the Mediterranean Sea to Cairo the cultivable area is not far from one hundred miles in width; from Cairo to Khartum it varies from three to seven or eight miles wide.

Geographic
and actual
extent

The food-producing power of Egypt depends on the Nile. In lower Egypt a considerable area is made pro-

Food-
producing
area



ductive at the ordinary stage of water by means of irrigating canals, but in upper Egypt the crops must depend upon the annual flood of the river, which occurs from June until September. During this period the river varies from twenty-five to forty feet above the low-water mark. In the irrigated regions three crops a year may be produced; in the flooded lands only one is grown.

Depend-
ency on
floods

Crops of
irrigated
lands

In order to add to the cultivable area two great engineering works have been constructed. A barrage and lock control the flow of water at Assiut; a huge dam at Assuan impounds the surplus of the flood season. These structures, it is thought, will increase the productive power of the country about one-fourth. Rice, maize (an Egyptian variety), sugar, wheat, and beans are the staple crops.

Irrigation
projects

Staple
crops

Rice is the food of the native people, but the crop is insufficient, and the deficit must be imported. The wheat, maize, and beans are grown for export to Europe, the last named being extensively used for horse-fodder. The sugar-growing industry is protected by the heavy yield and the cheap fellahin labor. The raw sugar is sent to the refineries along the Mediterranean. Onions are exported to the United States.

Production
of
food-stuffs

Sugar and
other
exports

The cotton-crop is an important factor, and in spite of its own crop the United States is a heavy purchaser of the long-staple Egyptian cotton, which is used in the manufacture of thread and hosiery. The cultivation of tobacco is forbidden by law, but Egyptian cigarettes are an item of considerable importance. They are made of imported Turkish tobacco by foreign workmen. There is a heavy export duty on native tobacco exported, and the ban on the inferior native-grown article is intended to prevent its admixture with the high-grade product from Turkey, and thereby to keep up the standard of the cigarettes.

Cotton
exports

Tobacco
manu-
factures

Egypt is nominally a vassal of Turkey, paying to the

Political
status

Sultan a yearly tribute of \$3,600,000. Great Britain's is the real controlling hand, because the Suez Canal is Great Britain's gate-way to India. By a purchase of the stock held by a former Khedive, Great Britain secured financial control of the canal, a necessary step from the fact that more than half the trade carried through the canal is British commerce.

Deficiency
in
resources

The country is deficient in the resources that make most nations powerful. There is neither coal, iron, nor timber available, and these must be imported. Great Britain supplies the first, and Norway the last. Some traffic is carried on the Nile, but railways have been built through the crop-lands. One of these threads the Nile Valley and will become a part of the "Cape to Cairo" route.

Railway
and river
trafficPorts and
trade
centres

Alexandria is the port at which most of the Egyptian commerce lands. *Cairo*, the largest city of Africa, derives its importance from its position at the head of the Nile delta. It is a favorite winter-resort. *Port Said* and *Suez* are the terminal ports of the Suez Canal; their commerce is mainly the transit trade of the canal.

Resources
of

Other Independent States.—Most of the independent states of Africa are in a condition of barbarism and have but little importance to the rest of the world. Abyssinia has the natural advantages of gold, iron, pasture-lands, and forestry, and the possibilities of cotton cultivation. Valuable mining concessions have been granted to foreign companies. Ivory, coffee, and gold are shipped to India in exchange for textiles. A railway from the coast is under construction, but all the traffic is carried by mule-trains, mainly to *Harrar*.

Trade and
exports

Position

Exports

Morocco has an admirable strategic position at the entrance of the Strait of Gibraltar, and is most likely, in time, to become a possession of Spain. There are exported, mainly to Great Britain, beans, almonds, goat-skins, and

wool. The goat-skins are sumac-tanned and are still used in making the best book-binding leather. Only a small part of the so-called Morocco leather of commerce is genuine. There are no railways; caravan routes from the Sahara cross the country. *Tangier* and one or two other ports are open to foreign trade. Coal-oil is the only import from the United States.

Morocco leather

Caravan trade

Imports

The state of Liberia was established for the benefit of freed slaves from the United States. The products are those of tropical Africa, including caoutchouc. Coffee cultivation is extensively carried on, and coffee is the leading export. *Monrovia* is the chief centre of trade.

Products and trade

North African Possessions.—French influence is paramount in northern Africa. Algeria and Tunis are both French colonies, and the caravan trade of the Sahara is generally tributary to French trade. The region known as the Tell, a strip between the coast and the Atlas Mountains, is the chief agricultural region, and the products are similar to those on the other side of the Mediterranean Sea. The ordinary grains are grown for home consumption, but the macaroni wheat crop is manufactured into macaroni paste for export. The fruit-crop, especially the olive, date, and grape, and their products, is exported.

French possessions

Sahara trade

Products

Esparto grass, for making paper, was formerly an important export, but the increasing use of wood-pulp for this purpose has had the effect of increasing the grazing area, and therefore the wool-crop. Date-palms grow in great profusion, and the excess forms an important export, going to nearly every part of Europe and the United States. A large part of the crop, however, is consumed by the Arabs. Sumac-tanned goat-skins, for book-binding leather, are also exported.

Esparto grass

Wool-growing

Date crop

Exports

The colonies must import coal. Manufactures are therefore restricted to the preparation of the fruit and food

Imports

products. Sponges are an important product. Railways provide the necessary transportation for the crops. *Algiers*, the metropolis, is a finely built city and a favorite winter-resort. *Oran* is the shipping-port for grain and esparto grass. *Biskra* is the market for dates.

The caravan trade of northern Africa is considerable, and the greater part converges at *Tripoli*, to which not far from ten thousand camel-loads of merchandise are brought annually. This trade is carried on mainly by the Arabs, who cover the region from *Timbuctu* to Lake Chad. They bring ivory, ostrich feathers, gold, goat-skins, and slaves. In return they carry cloth, fire-arms, ammunition, and various commodities to the negro villages of the Sudan. The district is a possession of Turkey. Its chief exports are esparto grass, sponges, and dye-stuffs.

Central Africa.—Central Africa is divided among the chief European powers. Great Britain and Germany divide the lake-region and the Zanzibar coast. On the Guinea coast the French are an additional factor. The trade of these regions consists of an exchange of tropical products—palm-oil, rubber, ebony, camwood, ivory, and hides—for cloth, tobacco, fire-arms, beads and trinkets, and preserved foods. Most of this trade is carried on by companies holding royal charters.

The Belgian Kongo, for many years a private corporation of which the King of the Belgians was chief executive officer, was formally annexed to Belgium in 1909. It is situated in the heart of tropical Africa, and its products are not unlike those of tropical South America. Tobacco, coffee, and cocoa are cultivated for export, but the natural products—rubber, palm-oil, palm-nuts, and white copal—are the chief exports.

The Kongo River is the outlet of the state and, to facilitate the transportation of the products, railways have been

Trade
centres

Caravan
trade

Division
among
European
powers

Trade

Organiza-
tion

Exports

Trans-
portation

built, or are under construction, around the rapids. This region is about the only remaining source of elephant ivory, but most of the supply consists of the tusks of animals long since dead. A fleet of steamboats carries the commercial products to the coast. *Stanley Pool* and *Leopoldville* are the chief depots for collection. Ocean steamships ascend the river to a point above *Boma*, the place of administration and chief shipping port.

Ivory
product

Trading
ports

Nigeria and Ashanti are British possessions on the Guinea coast,* having a trading company organization. Sierra Leone is an organized colony, a product of which is the kola-nut. British East Africa is important for strategic purposes, inasmuch as it includes the upper Nile basin, a territory sometimes known as the Egyptian Sudan. *Akra* is the trading port of Nigeria, and *Khartum* of the upper Nile Valley. *Zanzibar* is the metropolis of the east coast.

British
possessions

Trading
ports

The French possessions include a large territory at the mouth of the Kongo, the western part of the Sahara, and the islands of Madagascar and Reunion. In German East Africa and German Southwest Africa the commercial development has been substantial, and large plantations for the cultivation of tropical products are in operation. Railways from the interior to the coast furnish outlets for the products.

French
possessions

German
possessions

The Italians have nominal possession of a territory facing the Strait of Bab-el-Mandeb, and also of the peninsula of Guardafui. Their actual possession, however, is restricted to the island and trading-post of *Massawa*. Their attempts to conquer Abyssinia have been unsuccessful.

Italian
possessions

Cape of Good Hope and the South African Colonies.

—Up to the time of the Suez Canal, Cape of Good Hope was a sort of half-way house between British ports and

Commer-
cial
position

*This region is also known as the Gold Coast. Formerly it furnished the chief British supply of gold, and the gold coin known as the "guinea" received its name from this circumstance.

India, and this position made it commercially important. Even at the present time more than fifteen hundred vessels, many of them in the Indian Ocean trade, call at the chief port of the colony every year.

Production
of bread-
stuffs

Agriculture is the chief industry of these colonies, though not the one yielding the greatest returns. Enough wheat, maize (or "mealies"), and fruit are grown for home consumption, but the climate is too arid for any excess of bread-stuffs. The aridity is a resource, however, in the matter of wool, the superior quality of which is due largely to the deficient rainfall. As a matter of fact the whole country is a great grazing veldt; wool, a very fine quality of Angora mohair, hides, and cattle products are exports.

Effects of
aridity on
wool clip

Exports

Disposition
of fruit
crop

From December to March the fruits ripen, and these, especially the grapes, are carried in cold-storage vessels to British and other European ports. The wine is likewise of excellent quality and is becoming an export of great value. Both the fruit and the wine are similar to those of Australia and California.

Ostrich
plume
industry

The business of ostrich farming is in the hands of several large companies, and, next to the wool-crop, ostrich plumes are the leading product. There are nearly half a million birds, and each produces about one pound of feathers. The ordinary quality of plumes varies from five to ten dollars a pound; very choice plumes command as much as two hundred dollars a pound. London is the chief market for them, but most of them sooner or later find their way to the milliners of the great cities.

Diamond
mines

The diamond-mines of South Africa furnish practically the whole of the world's supply. The mines are operated on a most thorough business system, and the output of rough stones is carefully regulated to meet the demand. All wholesale dealers know the output from year to year, and no more stones are put upon the market

than the number required to meet the demand. All the Kimberley mines are now consolidated under one company. The yearly output does not vary much from twenty-five million dollars' worth of stones. The stones are marketed from *Kimberley*, but London dealers buy most of them.

Organiza-
tion of
de Beers
Company

The mines that for several years produced more gold than any others in existence are in the Transvaal.* Other undeveloped mines in the territory of Rhodesia are known to be extremely rich in precious metals; it is thought that the mines of Ophir were in this region. Copper ore is an important export.

Gold
product

Copper
product

The industries of Natal colony do not differ materially from those of Cape of Good Hope. The rainfall is sufficient for the growing of sugar-cane, and sugar is an important export to the mother-country. The colony has productive coal-mines, and these are destined to become an important resource.

Sugar
industry

Coal mines

The home government has encouraged railway building, and a trunk line through Rhodesia affords an outlet to the ports of the south coast. It is the policy of the mother-country to extend this road, known as the "Cape to Cairo" route, of which three thousand miles are now built, along the lake region and the Nile Valley to the Mediterranean Sea. This plan, already carried out in part, will give Great Britain a practical control of the trade of eastern Africa. The imports are mainly textiles, machinery, and steel wares.

Cape to
Cairo
trunk
railway

Trade

Cape Town is the most important centre of trade in South Africa. A considerable trade, however, is carried on at *Port Elizabeth* and at *Durban*, the port of Natal.

Trade
centres

* This region was formerly comprised in the Boer Republics, Orange Free State and South African Republic. In 1899 they declared war against Great Britain, with the result that they were defeated and annexed to that country—the former as Orange Colony, the latter as Transvaal Colony.

Kimberley is the seat of the diamond-mining interests, and *Johannesberg* of the gold-mines.

Walfish Bay, a British colony, is the actual outlet of German Southwest Africa, although the railway terminal is outside British territory. *Benguela* and *Loanda* are the ports of Angola, or Portuguese Kongo, and *Lourenço Marquez* of Portuguese East Africa. Its harbor on Delgoa Bay is one of the best on the coast. *Mombasa* is the commercial outlet of German East Africa.

Trade
centres

QUESTIONS FOR DISCUSSION

Has the partition of Africa been an advantage or a disadvantage to the native races of the continent?

What advantages will accrue to Great Britain from the Cape to Cairo railway?

Compare the basin of the Kongo with that of the Amazon with respect to climate, products, and civilization.

From Commercial Africa prepare a list of the exports and imports between the United States and the various African countries.

FOR COLLATERAL READING AND REFERENCE

Statesman's Year-Book.

Commercial Africa—pp. 3679 and following.

From a cyclopædia read the following topics: Ivory, Suez Canal, Gibraltar, Livingstone, Diamonds, Canary Islands.

CHAPTER XXXIV

OCEANIA

OCEANIA, the island division of the world, includes Australasia and the great groups of islands in the Pacific Ocean. Some of the larger islands are regions of great productivity; others are important as coaling-stations; still others have positions of great strategic value.

Position
and extent

When it is considered that more than half the people in the world live on the slopes of the Pacific Ocean, and that they depend on the metal-working and manufacturing people of the Atlantic slopes for clothing and commodities, it is apparent that the commerce of the Pacific Ocean must reach enormous proportions.

Population
on Pacific
coast

For this reason the various island groups of Oceania have been acquired by Europeans, and from the moment of their occupation their commercial development began. The great majority of these groups are within the limits of the sago-palm, bread-fruit, cocoanut, and banana, and these yield not only the food-stuffs of the native people, but the export products as well. Copra, or dried cocoanut meat, is the general export. It is marketed in Marseille, London, and San Francisco. Sago is prepared from the pith of a species of palm. Considerable quantities are also exported, and it is used as a table delicacy. The banana is the food-stuff upon which many millions of people must depend. In spite of their small aggregate area, the food-producing power of these islands is very great.*

Acquisition
of Pacific
islands

Products
of Pacific
islands

Exports

Value of
banana

* It is estimated that twenty-two acres of land are necessary to sustain one adult on fresh meat. The same area of wheat would feed forty-two people; of oats about eighty-five people; of maize, potatoes, and rice, one hundred and seventy people. But twenty-two acres planted with bread-fruit or bananas will support about six thousand.

Productivity
of
banana

Value of
position of
Honolulu

Position of
Pago Pago

Labor
problems

Compara-
tive
position

Wool
product

Markets

Cold-
storage
meat trade

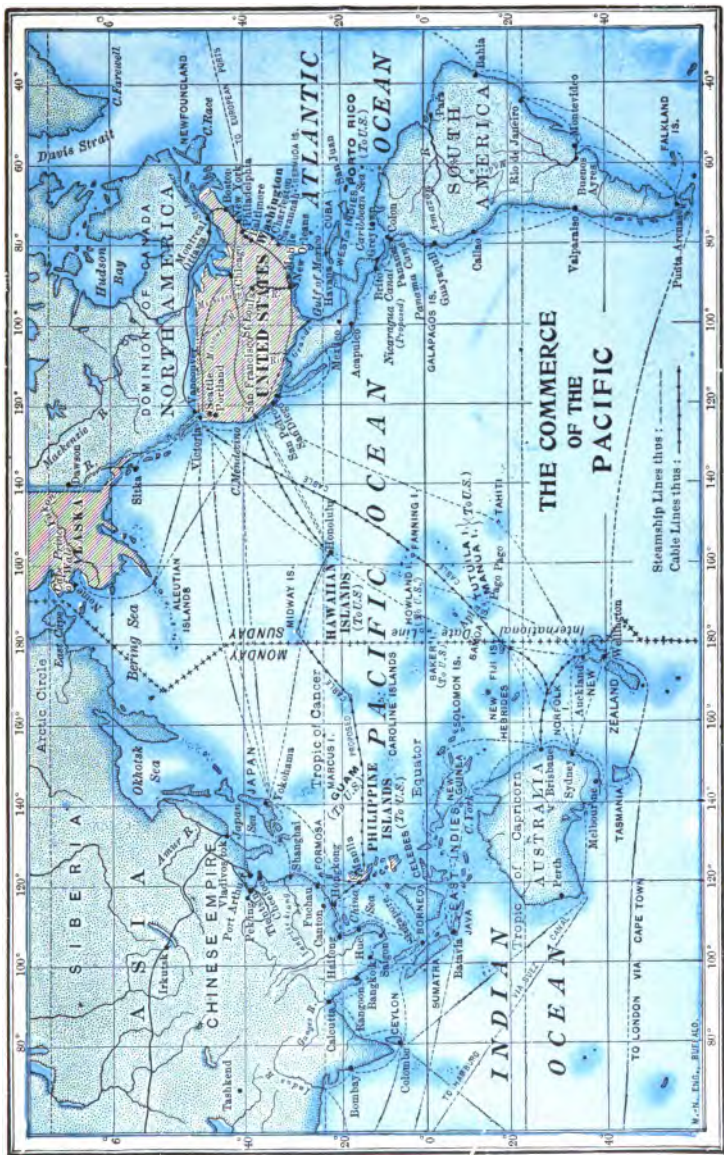
On account of its central position, *Honolulu*, the capital and chief port of Hawaii, is the most important mid-ocean station of the Pacific. It is almost in the direct line of traffic between the Pacific ports of the United States and Canada on the one hand, and those of Australia, Japan, and China on the other. It is also in the route of vessels that may hereafter use the Panama Canal in going between European and Asian ports. *Pago Pago*, on Tutuila, an island of the Samoan group, is also destined to be a mid-ocean station.

In the cultivation of export products native Malay labor is almost always employed, inasmuch as Europeans cannot bear out-of-door labor in the tropics. The natives are generally known as "Kanakas," and there is not a little illicit traffic in their labor. Chinese, Hindu, and Japanese coolies are also employed as laborers.

The Commonwealth of Australia.—The commonwealth of Australia consists of the various states of Australia together with Tasmania. Their position corresponds very closely to that of Mexico and Central America, and the climate and products are not unlike. A considerable part of Australia is a desert, and a large area is too arid for the production of bread-stuffs; the eastern coast, however, receives abundant rains.

Australia produces nearly one-third of the wool-clip of the world. On account of the climate, the quality of the wool, much of it merino, is excellent. More than half the clip comes from New South Wales. Two-thirds of the wool goes to Great Britain to be manufactured; nearly all the rest is purchased by France, Germany, and Belgium. A very small quantity is sold to the United States.

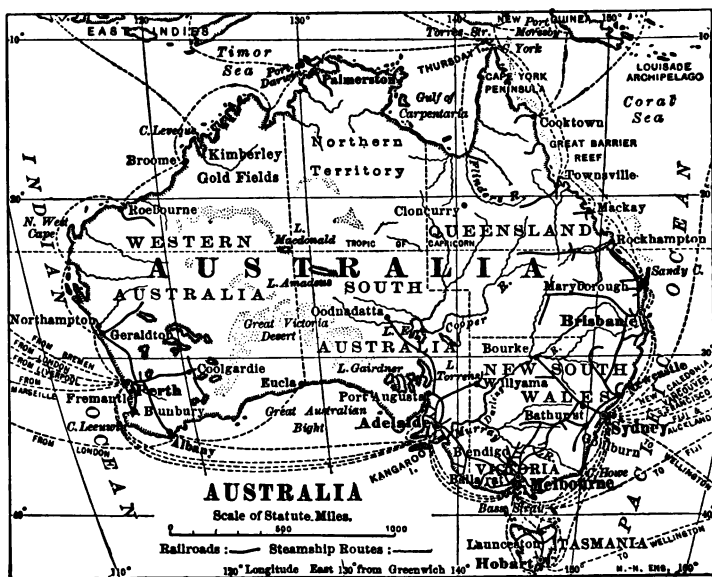
Since the introduction of cold-storage plants in steamships, Australia has become a heavy exporter of meat. Areas long unproductive are now cattle-ranges; mutton constitutes the heaviest shipment. Inasmuch as the transportation is almost wholly by water, the cost is very light,



and the mutton can be sold to London dealers at less than half the price of English mutton.

Grain and
fruit crops

Wheat is grown mainly for home consumption. Grapes for wine and for raisins are good-paying crops in Victoria and New South Wales. Both products find a ready market in Great Britain. Australian claret is a strong competitor of California claret for public favor, and the two are



Sugar crop

Forest
products

Lumber
imports

similar in character. Cane-sugar is grown in the moist regions of Queensland; it is the chief supply of the commonwealth and the neighboring islands. The forests produce an abundance of hard woods, but practically no building-timber. Jarrah wood paving-blocks are an important export. British Columbia, Washington, and Oregon supply much of the building-timber.

Gold has been the chief mineral product since the settle-

ment of the country. The mints convert the metal into coin. As a rule the value of the exports exceeds that of the imports, and the excess swells the amount of metal exported. The most productive mines are in the district of Ballarat. Coal is abundant on the east coast; a considerable part is sold to California, and more to Asian ports. Tin is extensively mined in Tasmania.

Gold product

Coal exports

Tin

More than fifteen thousand miles of railway have been built to carry the traffic of the country. Most of them were built by private corporations, but on account of financial difficulties and poor service they were acquired by the government. The policy proved a wise one.

Railways and government ownership

Great Britain encourages the trade of her colonies, and gets about three-fourths of the traffic of the commonwealth, the imports being manufactured goods. Of the foreign trade the United States has about half, nearly all of which is landed at San Francisco and Puget Sound. Wool, cattle products, and coal are exported to the United States, and the latter sends to Australia structural steel—mainly rails—printing-paper, and coal-oil.

Trade with Great Britain

Trade with United States

Melbourne is the largest city. *Sydney* is the port at which most of the ocean trade is landed. *Brisbane*, mainly a coal and a wool market, is connected with British Columbia by an ocean cable. Steamships by way of the Suez Canal generally call at *Perth* and *Adelaide*. *Hobart* and *Launceston* are the markets of Tasmania.

Trade centres

New Zealand.—This colony is one of the most prosperous and best administered states in existence. The cultivable lands produce enough wheat for home use, and an excess for export. Cattle and sheep are the chief resource, however, and pretty nearly everything—meat, hides, wool, horn, and bones—is exported. Dairy products are not forgotten, and under the management of an association, these are of the best quality.

Bread-stuff products

Cattle products

New Zealand flax **New Zealand flax** (*Phormium tenax*), a kind of marsh hemp, yields a fibre used in making cordage. The kauri pine furnishes the chief supply of lumber. A fossil kauri gum is collected for export; it makes a varnish almost equal to Japanese lacquer. Gold is mined, and there being no mint, all the bullion is exported. The only manufactures are those which are connected with the meat export and the dairy industry. The exports noted more than pay for the manufactured goods. Most of the trade is carried on with Great Britain. *Wellington*, the capital, and *Auckland* are the centres of trade.

Kauri gum

Gold

**Manu-
factures**

Trade

Relative size **New Guinea.**—This island, one of the largest in the world, is somewhat larger than the State of Texas, or about one-third larger than Germany or France. The gold-mines first led to the exploration and settlement of the island, but it was soon apparent that the agricultural resources were even more valuable, and it was divided among the British, Germans, and Dutch.

Resources

Political control

**Agri-
cultural products** The western part of the island is distinctly Asian in character; the eastern and southern parts resemble Australia. Coffee, rice, and tobacco plantations have been established in the former; grazing is the chief industry in the latter. Ebony and bamboo are among the forest products.

Extent **British Possessions.**—The Fiji Islands are among the most important British possessions. They number about eighty habitable and twice as many small islands. Sugar is the chief export product, and it goes mainly to Australia and New Zealand. Cocoanuts and copra are also a large item of export trade. *Suva* is the chief trading-port.

Products

Other British possessions The Tonga Islands are nominally independent, but are practically a British protectorate. Among other British possessions are Cook, Gilbert, and Ellice archipelagoes, and Pitcairn Island.

German Possessions.—The Samoa Islands are per-

haps the most important German possession, and German planters have made them highly productive. They were formerly held under a community-of-interest plan by Great Britain, Germany, and the United States. A joint commission awarded the greater part of the territory to Germany. In addition to the ordinary products, pineapples and limes are exported. Most of the trade is carried on by way of Australia. *Apia* is the trading-port.

Political
control

Bismarck Archipelago, and the Solomon, Marshall, and Caroline groups have also been acquired by Germany. The last named was purchased from Spain at the close of the Spanish-American War.

Other
German
possessions

French Possessions.—New Caledonia, together with Loyalty Islands, Fortuna, and the New Hebrides group, have great wealth in the matter of resources. New Caledonia, a penal colony, has productive mines of chrome iron ore and copper. It is the source of a considerable supply of nickel and cobalt. A railway to the coast has been built for the carriage of these products.

Mineral
resources

Tahiti is the principal island of the Society group, and under the missions long established there, the natives have become civilized. In addition to the usual trade, sugar and mother-of-pearl are important exports.

Pearl shell
product

QUESTIONS FOR DISCUSSION

How will the commerce of the Pacific be changed by the construction of an isthmian canal?

What has been the effect of the Australian wool-clip on the cloth-making industry of England and Germany?

How will the acquisition of Hawaii and the Philippine Islands affect the commerce of the United States?

From Commercial Australia find the trade of the United States with the Commonwealth.

FOR COLLATERAL READING AND REFERENCE

From a cyclopædia read the history of Australia as a convict colony.

Commercial Australia.

APPENDIX

COMMERCE OF THE WORLD'S GREAT PORTS

PORT	TOTAL TRADE	PORT	TOTAL TRADE
London	\$1,866,930,872	New York City	\$1,966,226,617
Liverpool	1,816,983,279	Galveson	289,278,493
Hull	391,005,790	New Orleans	252,379,377
Manchester	276,017,966	Boston	216,152,108
Southampton	253,593,617	Philadelphia	169,525,022
Glasgow	247,146,083	Baltimore	149,369,677
Grimsby	174,640,475	San Francisco	128,523,066
Harwich	168,784,206	Fuget Sound	114,021,792
Leith	119,901,951	Montreal	240,989,666
Bristol	105,191,014	Havana	118,634,992
Hamburg	1,960,779,855	Buenos Aires	479,536,241
Bremen	501,146,540	Santos	251,995,853
Antwerp	1,120,047,300	Rio de Janeiro	171,553,500
Marseilles	648,163,000	Shanghai	185,688,559
Havre	523,886,000	Yokohama	235,227,552
Dunkirk	213,085,000	Kobe	224,839,791
Bordeaux	183,458,000	Singapore	269,500,346
Genoa	281,069,068	Calcutta	447,229,560
Trieste	307,512,228	Bombay	364,744,793
St. Petersburg	143,169,832	Alexandria	276,547,429
Riga	141,757,801	Sydney	277,732,800
		Melbourne	191,841,357

PRINCIPAL CANALS OF THE UNITED STATES

NAME	LENGTH IN MILES	DRAUGHT IN FEET	LOCATION
Albemarle and Chesapeake	44	7½	Norfolk to Currituck Sound
Black River	35	4	Rome, N. Y., to Lyons Falls, N. Y.
Champlain	81	6	Whitehall, N. Y., to Water- villet, N. Y.
Chesapeake and Ohio	184	6	Washington to Cumberland, Md.
Des Moines Rapids	7½	5	Des Moines Rapids, Mississippi River
Erie (barge) not completed	387	12	Buffalo and Albany, N. Y.
Hocking	42	4	Carroll and Nelsonville, O.
Illinois and Michigan	102	6	Chicago and La Salle, Ill.
Illinois and Mississippi	75	7	Around Rock River Rapids to Mississippi River
Lehigh Coal and Nav. Co.	108	6	Coalport and Easton, Pa.
Louisville and Portland	9½	...	Falls of Ohio, Louisville, Ky.
Ohio	317	4	Cleveland and Portsmouth, O.
Miami and Erie	274	5½	Cincinnati and Toledo, O.
Oswego	38	7	Syracuse and Oswego, N. Y.
Panama	50	41	Across Isthmus of Panama
Pennsylvania	193	6	Columbia and Huntington, Pa.
Port Arthur (ship)	7	25	Port Arthur, Texas and Gulf of Mexico
Schuylkill	108	6½	Pennsylvania
St. Mary's Falls	2	22	Lake Superior and Lake Huron
Welland (ship)	27	14	Lake Erie and Lake Ontario

THE COMMERCE OF THE UNITED STATES IN 1913

Value of exports, including gold and silver.....	\$2,615,261,082
Value of imports, including gold and silver.....	1,923,470,775
Balance of trade in favor of U. S.....	\$691,791,307

Principal Articles of Export

Agricultural implements.....	\$40,572,352
Animals—cattle, horses, hogs, etc.....	7,080,122
Beef and hog products.....	133,221,420
Cars (automobiles), carriages, and other vehicles.....	54,585,888
Chemicals, drugs, and medicines.....	26,574,519
Coal—anthracite and bituminous.....	65,107,221
Copper, metallic.....	140,164,913
Corn.....	28,800,544
Cotton, manufactured.....	53,743,977
Cotton, unmanufactured.....	547,357,195
Iron and steel.....	304,605,797
Oats.....	13,206,247
Oil (petroleum, refined).....	129,666,995
Tobacco—leaf.....	49,353,595
Wheat and wheat flour.....	142,217,965
Wood and woodenware.....	115,704,777

Principal Articles of Import

Art works.....	\$52,875,637
Chemicals, drugs, dyes, and medicines.....	99,350,155
Coffee.....	118,963,209
Copper and copper manufactures.....	45,909,900
Cotton, raw.....	22,987,318
Cotton, manufactured.....	66,065,857
Fibers (ramie jute and sisal hemp), raw and manufactured.....	125,048,075
Fruits and nuts.....	42,622,653
Furs.....	24,864,743
Hides and skins.....	117,386,174
India-rubber.....	101,333,168
Iron and steel.....	33,636,358
Jewelry and precious stones.....	50,518,023
Oils.....	38,112,883
Silk and silk manufactures.....	112,504,135
Sugar.....	103,639,823
Tin.....	53,112,594
Tobacco, leaf and manufactures.....	42,496,482
Wood and woodenwares.....	61,824,088
Wool and woolen goods.....	51,897,964

PRINCIPAL PRODUCTS OF THE UNITED STATES

ARTICLE	YEAR	QUANTITY	VALUE
Gold, ounces.....	1912	4,520,719	\$93,451,500
Silver, ounces.....	1912	63,766,800	89,197,500
Coal, anthracite, long tons..	1912	73,056,766	177,622,626
Coal, bituminous, long tons..	1912	377,000,066	517,983,445
Petroleum, bbls. of 42 gals..	1913	222,113,218	163,802,334
Cement, bbls. of 380 lbs.....	1913	83,351,191	67,461,513
Pig iron, long tons.....	1913	30,180,969	420,563,388
Steel, billets and rails.....	1913	31,251,303
Iron and steel manufactures..	1913	304,605,797
Copper, tons.....	1912	6,121,634	205,139,338
Cane sugar, long tons (Louisiana)	1912	316,000	} Consumption per capita in U. S. 83½ lbs.; value \$3.90 —\$4.40 per cwt.
Cane sugar, long tons (P. R., H. I., and P. I.).....	1912	1,046,000	
Beet sugar, long tons.....	1912	541,101	
Cotton, bales of 500 pounds..	1913	14,128,902	.11½ to .14½ per lb.
Corn, bushels.....	1912	3,124,746,000	.56—.70 per bu.
Oats, bushels.....	1912	1,418,377,000	.37—.46 per bu.
Wheat, bushels.....	1912	730,267,000	.84 to \$1.15 per bu.
Hay, tons.....	1912	79,691,000	856,695,000
Rice, bushels.....	1911	22,934,000	18,274,000
Tobacco, pounds.....	1912	962,855,000	104,063,000
Apples, bushels.....	1910	175,397,000
Cattle, number.....	1913	56,527,000	1,872,428,000
Horses, number.....	1913	20,567,000	2,278,222,000
Sheep, number.....	1913	51,482,000	202,779,000
Wool, pounds.....	1912	304,043,000	75,819,251
Hogs, number.....	1913	61,178,000	603,109,000
All farm products.....	1910	8,926,000,000

COST OF LIVING

The average prices of about two hundred commodities for a ten-year period, 1890-1899, were taken as a basis, or 100 per cent. The excess up to August, 1913, is the per cent of increase. Sugar is the only article showing a decrease in price. The figures opposite each article is the per cent of increase:

Wheat flour.....	27.9	Potatoes.....	75.2
Milk.....	38.8	Beef, ribroasts.....	76.5
Butter.....	41.9	Steak, best cuts.....	79.3
Corn meal.....	60.0	Ham.....	92.2
Eggs.....	66.4	Steak, round cuts.....	108.4
Lard.....	69.8	Pork chops.....	124.5
Poultry.....	73.2	Bacon.....	138.0

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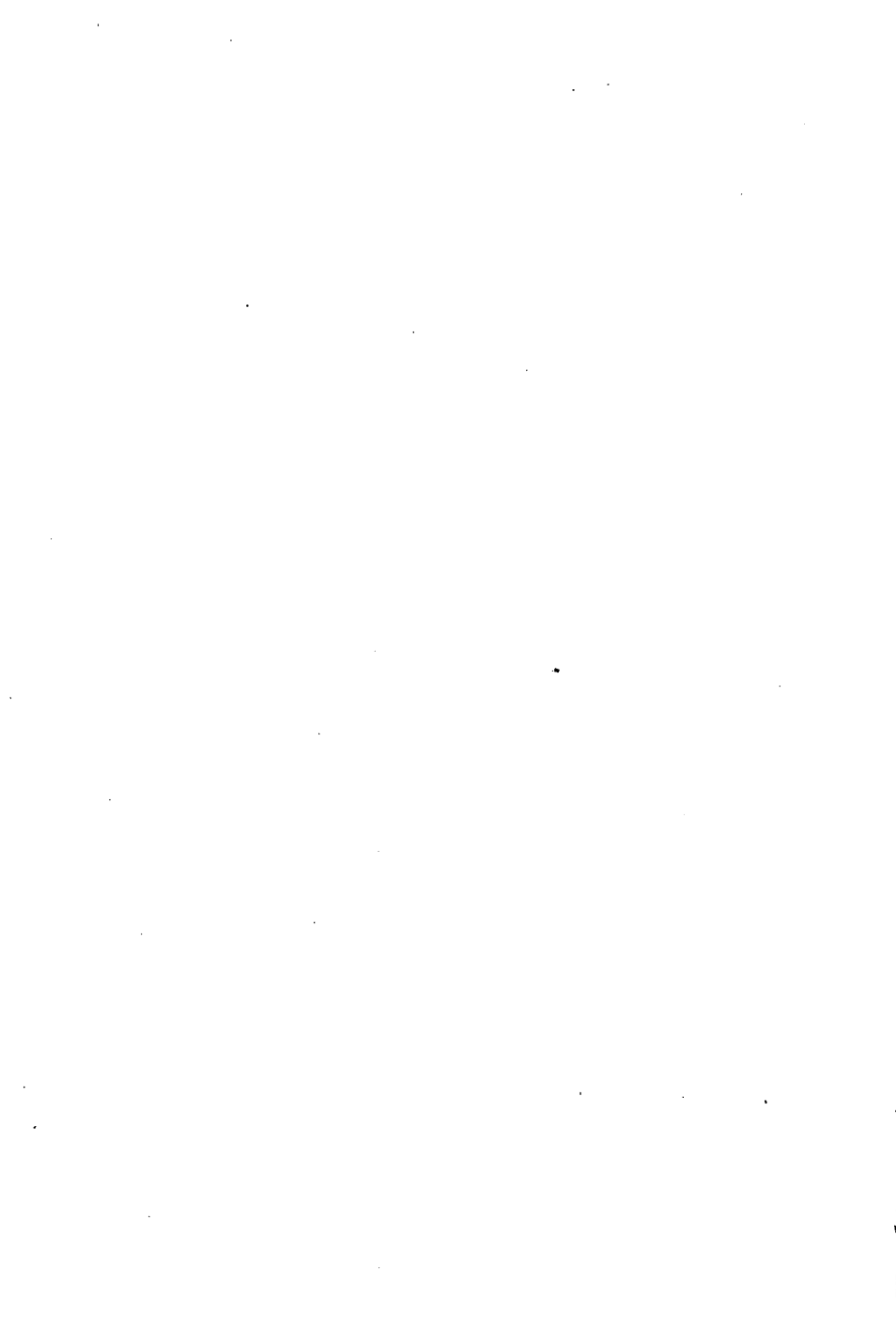
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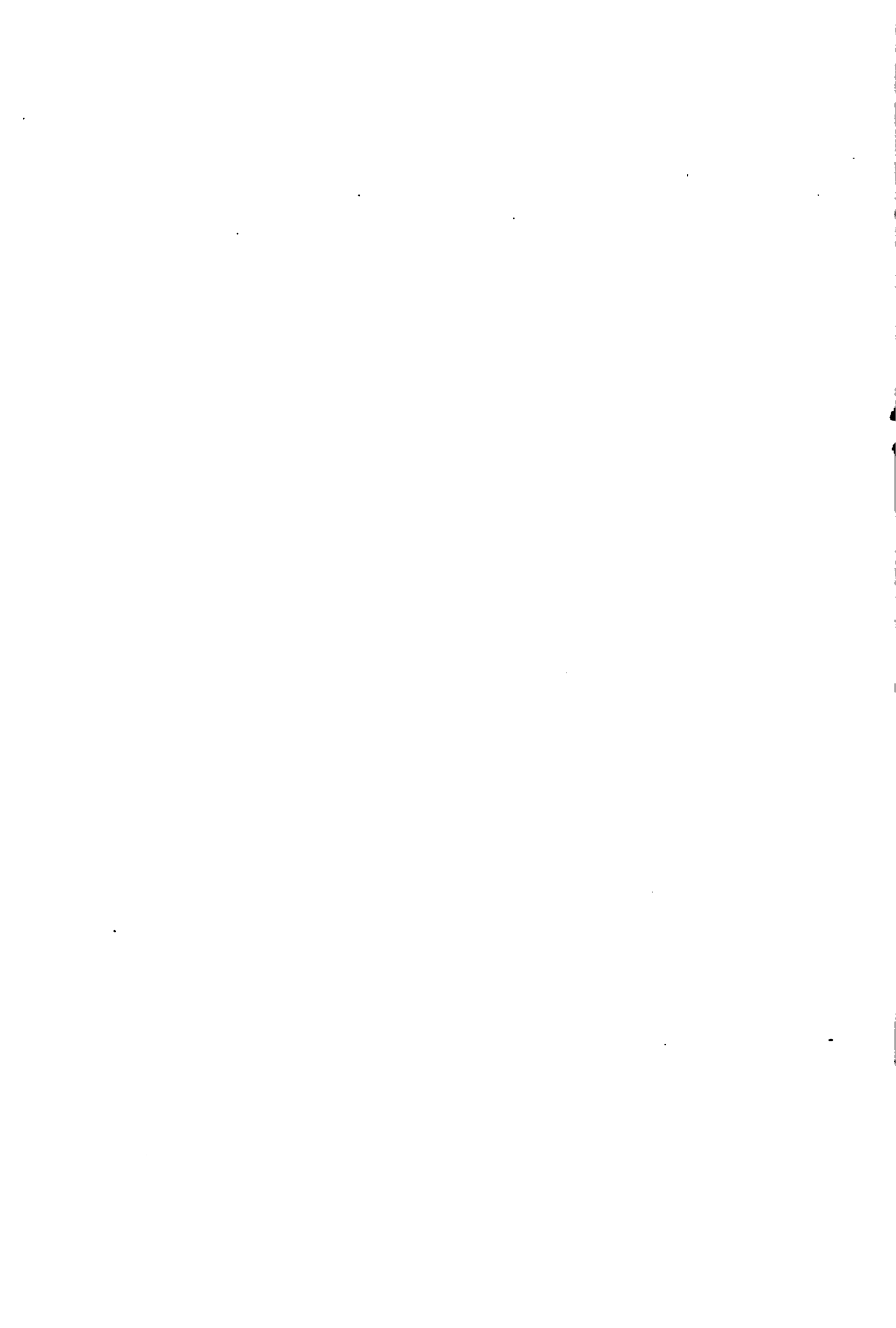
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